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A COMPARATIVE ANALYSIS OF PATIENT ACCESS MODES AT WILFORD HALL UNITED STATES AIR FORCE MEDICAL CENTER AND SELECTED CIVILIAN MEDICAL CENTERS

A Graduate Research Project

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This study examined patient access modes of selected civilian medical centers comparable to Wiford Hall in size, specialty mis, workload, and mission to determine if a more responsive and efficient patient mode could be found for implementation. Appointment systems, clinic operations, and admission systems were compared between facilities. Numerous enhancements to patient access were identified in each of the three areas of focus. The study concluded with a specific implementation plan.

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I. INTRODUCTION

Wilford Hall USAF Medical Center (WHMC) is a primary Air Force area medical center which provides health care services to authorized Department of Defense health care beneficiaries residing in the greater San Antonio metropolitan area; consultative support to twenty-two medical facilities in Texas, Oklahoma, Colorado and Louisiana; and world-wide referral support to all other Air Force medical treatment facilities including five medical centers and ten regional hospitals. The mission of WHMC is to conduct a comprehensive program of clinical medicine, professional education and technical training, clinical research, medical readiness, and mobility requirements in support of the United States Air Force mission.

At the present time WHMC has just completed the final stages of a highly dynamic phase of development. A major construction project modernized the structure by: (1) converting large open wards with one latrine, into private and semi-private rooms with modern accommodations; (2) greatly expanding clinic and ancillary support space; and (3) significantly increasing the availability of physician offices and examining rooms. The project was completed in June of 1983.

In consonance with the modernization and expansion of the physical plant, introspection of the total system by executive management at WHMC resulted in the identification of additional operational aspects of the health care delivery system which might

be improved to enhance patient care. Two examples of executive management's initiative which have already been undertaken include a total reengineering of the facility's manpower requirements by an Air Force Medical Management Engineering Team, and a realignment of the organizational structure to improve span of control, channels of communication and line of authority.

The raison d'être of the health care delivery system is the provision of quality health care to patients. In recognition of this fundamental component of the social contract, executive management deemed it necessary to request research be conducted to assure there were responsive and efficient patient access modes to health care services at WHMC. Executive management further proposed that an appropriate method of researching patient access modes might be based on a comparative analysis of current patient access modes at WHMC and several civilian medical centers of comparable size. This project has pursued the subject of patient access in such a manner.

In December of 1982, a number of civilian medical centers were identified and approached on the possibility of participating in the project. Copies of the Graduate Research Project Proposal were forwarded to these institutions along with copies of more detailed procedural documents which further explained the intent of the project. Copies of the detailed procedural documents are presented in Appendix A. By January 1983, the following medical centers had responded favorably to project participation and were selected: Ochsner Clinic, New Orleans, Louisiana; Mayo Clinic,

Rochester, Minnesota; and Cleveland Clinic, located in Cleveland, Ohio.

Statement of the Research Question

Are selected civilian medical centers which are comparable to WHMC in size, specialty mix, workload, and mission, providing responsive and efficient patient access modes which could be successfully implemented at WHMC and other military medical treatment facilities to enhance patient access?

Factors Influencing the Research

The specific sequential objectives of this research effort include the identification and definition of existing patient access modes at WHMC; the comparison of the WHMC access modes with those of three comparable sized civilian medical centers; the identification of the significant variations that exist between the access modes at WHMC and the three civilian facilities; identification of the variations which contribute to, or detract from, responsive and efficient patient access; the selection of variations which provide the most responsive and efficient patient access; and the development of a plan to implement the selected variations at WHMC.

The research hypothesis was evaluated through a series of hypotheses tests involving the difference between the population means. The hypotheses tested are: the null hypothesis of no difference between the means, and the alternative hypothesis of

inequality between the means. The selected level of significance for these tests is 5 percent.

The following sample means were determined for selected clinical specialties in each facility: (1) the mean number of attempts a patient makes to access the appointments desk by phone, (2) the mean waiting time between scheduled appointment times in clinics and actual access to a provider's exam room, and (3) the mean waiting time for pre-admission administrative processing (collectively for all clinical specialties). Additional descriptive measures for each institution were collected from historical data and observation of current levels of facility staffing and utilization. Desriptive measures obtained include: (1) mean of patient encounters per provider (adjusted for provider availability in each clinic), (2) mean of patient visits per month during calendar year 1982, (3) the next available appointment date for a routine visit in each clinic, (4) the distribution and level of staffing in each clinic, appointment desk, and admitting office.

The following assumptions were established for this research project:

1. The aggregate capabilities and experience of health care providers at any one of the facilities being observed are similar to the aggregate capabilities and experience of the health care providers at each of the other observed facilities.

2. The demand for health care by the patient population, seeking access to similar clinics or services at each of the

observed facilities, is at least approximately normally distributed.

3. Resources required to support recommendations which are developed as a result of this research effort and incorporated in the implementation plan can be obtained in a timely manner.

Due to the size and volume of medical specialties available at each of the medical centers which were observed in this research effort, it was unrealistic to attempt a comparative analysis of every specialty available at each of the facilities. This becomes readily apparent when considering the probability of finding three civilian medical centers with the exact same specialty mix that exist at WHMC. In light of this situation, the scope of this research effort was limited to the observation of the following selected clinical specialties: (1) General Practice, (2) Pediatrics, (3) Obstetrics and Gynecology, (4) General Surgery, (5) Orthopedics, and (6) Internal Medicine. Selection of these clinical specialties was based on their commonality in health care facilities, and their traditionally high volume of patient workload which tends to exacerbate patient access problems.

In addition to the limitation which was imposed on the number of clinical specialties that were to be observed, consideration was given to the host of factors that influence patient access. Some of the traditional factors which influence access include availability of services and providers, facility design, location of facilities, transportation, appointment systems, hours of operation, communications capabilities, cost and affordability,

insurance, patient education, patient attitudes, provider attitudes, admission procedures, bed utilization, support staff, and discharge policies.

Once again the comparability between facilities would have been difficult. The comparison of cost and affordability is an excellent example. Although it can be argued that cost and affordability influence access to military medical facilities, their impact is significantly less than it would be in civilian facilities. For this reason, the factors that are considered in this research effort were limited to; volume and availabilty of services and providers, facility design, appointment systems, hours of operation, time allotted per appointment, communications capabilities, admission procedures, bed utilization, support staff, and discharge policies.

Literature Review

Access to the health care delivery system has received considerable attention in the past, yet it remains very difficult to define and measure operationally.[1] A review of recent literature accents the absence of an accurate definition for the term among authors. Certain authors relate "access" to the entry into or use of the health care system. However, many of the authors seem to prefer using the term conceptually to describe the host of factors which may influence entry into or use of the system.[2] The latter group of writers use the term in discussing the operational impact of factors which may influence access,

while the former group use their interpretation of the term in discussing public policy.[3] This research effort is concerned with factors which influence consumer entry into and use of the health care delivery system, and emphasis has been placed on literature which defines "access" in this manner.

Many of the authors addressing factors which influence access to health care tend to target their own selected group of factors for discussion. The rationale for this approach appears to be based on the vast range of factors which can influence access to the system.

Freeborn and Greenlick address access in their methodology for evaluating the technical and psychosocial aspects of effective ambulatory care performance:

> There are several criteria against which accessibility of care should be measured. Ideally, individuals should have access to the system at the time and place needed, through a well-defined and known point of entry. A comprehensive range of personnel, facilities, and services that are known and convenient to the population should be available. In addition, there should be equal access and use that is proportional and appropriate to need.[4]

This statement embodies all of the major elements that should be considered in a statement of mission, or goals and objectives, of any clinical medicine activity. The major elements are: timeliness, location, defined entry, comprehensive resources, consumer information, patient convenience, and equality.

Socioeconomic factors of access such as personal income, prices for health services, and the role of Medicare and Medicaid have been addressed by Bice et al.[5] Although this project does not directly address socioeconomic factors related to access, it recognizes their significant influence on both the patient and the medical facility. In his discussion regarding the determinants of the allocation of health care services, Fein also addressed personal income as a "major" factor of access.[6] Fein additionally considered geographical area and the supply of services as influential factors of access.[7] Donabedian likewise referred to geographical access factors in terms of the location of health services and the distance consumers must travel to obtain care.[8]

None of the authors reviewed claimed to have addressed all of the factors which may influence access to health care. However, Penchansky and Thomas have presented a taxonomic definition of "access" in which all potential factors of access may be placed in "access dimensions":

> "Access" is defined as a concept representing the degree of "fit" between the clients and the system. ....Access is viewed as the general concept which summarizes a set of more specific areas of fit between the patient and the health care system. The specific areas, the dimensions of access, are as follows:
>
> Availability, the relationship of the volume and type of existing services (and resources) to

the clients volume and types of needs.

Accessibility, the relationship between the location of supply and the location of clients, taking account of client transportation resources and travel time, distance and cost.

Accommodation, the relationship between the manner in which the supply resources are organized to accept the clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness.

Affordability, the relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance.

Acceptability, the relationship of clients' attitudes about personal and practice characteristics of providers to the actual characteristics of existing providers, as well as to provider attitudes about acceptable personal characteristics of clients.[9]

Each of the factors of "access" addressed by these authors, and others, can be placed into one of these dimensions of access. Each of the factors which will be considered in this research project "fit" into the dimensions of accommodation and availability.

Research Methodology

The first step accomplished in this research effort was the identification of patient access modes now in existence for the selected clinical specialties at WHMC. To facilitate observation in a uniform manner, access modes at WHMC and each of the civilian medical centers were addressed in three segments; Appointment Systems, Ambulatory Clinic Operations, and Admission and Disposition Systems. Procedural models (flow charts) were developed to depict the sequential steps that must be taken by patients to gain access to each of these segments.

After the patient access modes for WHMC were clearly described through the use of procedural models, statistical sampling was accomplished to determine: (1) the mean number of attempts a patient makes to access the appointments desk by phone, (2) the mean waiting time between scheduled appointment times in clinics and actual patient access to a provider's exam room, and (3) the mean waiting time for pre-admission administrative processing (collectively for all clinical specialties). Sample sizes were determined by conducting pilot samples and applying appropriate formulas for sample size determination as suggested by Daniel, et al.[10] Additional descriptive measures were collected from historical data and observation of current levels of facility staffing and utilization. Desriptive measures obtained include: (1) mean of patient encounters per provider (adjusted for provider availability in each clinic), (2) mean of patient visits per month during calendar year 1982, (3) the next available appointment date

for a routine visit in each clinic, (4) the distribution and level of staffing in each clinic, appointment desk, and admitting office.

After the procedural models and statistical data for WHMC were obtained, a one week site visit was conducted at each of the selected civilian medical facilities. The purpose of these site visits was to develop procedural models and collect statistical data that could be compared to the WHMC data.

Once the sample means listed above were identified for each facility, hypothesis testing was conducted to compare the respective means for WHMC with the corresponding means for the other facilities. Analysis of the sample data was accomplished using BMDP Statistical Software developed at the University of California.[11] Specific BMDP Programs utilized in computing data included: (1) P2D, Detailed Data Description, Including Frequencies; (2) P1V, One-Way Analysis of Variance and Covariance; and (3) P7D, Description of Groups (Strata) with Histograms and Analysis of Variance.[12] If the results of the hypothesis testing indicated the the difference between the means was significant, comparisons of system procedures at WHMC and the facility in question were made to identify elements which may be contributing to the difference.

Variations in procedures which appear to significantly contribute to, or detract from, responsive and efficient patient access are identified and discussed. Procedural variations which appear to enhance patient access but do not exist at WHMC have

been recommended for adaptation. Those procedures which currently exist at WHMC and appear to detract from patient access have been recommended for elimination.

The final step in this research effort is a proposed implementation plan for the recommendations. This plan considers methods of obtaining resources, orientation of patients and staff, evaluation techniques, time phase, and other considerations which were identified as a result of the research.

FOOTNOTES

[1]U.S. House of Representatives, A Discursive Dictionary of Health Care (Washington, D.C.: U.S. Government Printing Office, 1976).

[2]Roy Penchansky and J. William Thomas, "The Concept of Access," Medical Care 19 (February 1981): p. 127.

[3]Ibid.

[4]Donald K. Freeborn and Merwyn R. Greenlick, "Evaluation of the Performance of Ambulatory Care Systems: Research Requirements and Opportunities," Medical Care 11 (March/April, 1973): p. 69.

[5]Thomas W. Bice, Robert L. Eichhorn, and Peter D. Fox, "Socioeconomic Status and Use of Physician Services: A Reconsideration," Medical Care 10 (May/June 1972): p. 261.

[6]Rashi Fein, "On Achieving Access and Equity in Health Care," Milbank Memorial Fund Quartertly 44 (Second Quarter 9172): p. 157.

[7]Ibid.

[8]Avedis Donabedian, Aspects of Medical Care Administration (Cambridge, Mass.: Harvard University Press, 1973).

[9]Roy Penchansky and J. William Thomas, p. 128.

[10]Wayne W. Daniel, Biostatistics: A Foundation for Analysis in the Health Sciences (2d ed. New York: John Wiley and Sons, Inc., 1978): p. 142-146,

[11]W. J. Dixon, ed., BMDP Statistical Software (Los Angeles: University of California Press, 1983)

[12]Ibid., pp. 80, 105, 347 passim.

II. DISCUSSION

Wilford Hall Medical Center

General

Wilford Hall USAF Medical Center (WHMC) is a 1000 bed primary United States Air Force area medical center which provides health care services to Department of Defense health care beneficiaries residing in the greater San Antonio area; consultative support to twenty-two military medical facilities in Texas, Oklahoma, Colorado, and Louisiana; and world-wide referral support to all other Air Force medical treatment facilities. WHMC conducts a comprehensive program of clinical medicine, professional education and technical training, clinical research, medical readiness, and mobility requirements in support of the United States Air Force mission.

During calendar year 1982, the WHMC staff provided approximately 900,000 outpatient visits and 22,200 inpatient admissions for the Medical Centers benificiaries. Inpatient admissions are down from a normal range of 30,000 per year due to the major construction project addressed earlier. The Medical Center is staffed by approximately 3,600 full time employees including 163 staff physicians and over 270 residents and fellows. Patient care is available in thirty-four clinical specialties plus a significant number of related sub-specialties.

All clinical specialties are organized under the Directorate of Hospital Services, and structured into five divisions: (1) the

Division of Medicine, (2) the Division of Surgery, (3) the Division of Maternal and Child Care, (4) the Division of Support (Pathology, Radiology, and Pharmacy), and (5) the Division of Nursing. Each division has designated clinical specialties and sub-specialties which are organized as departments and services. The Department and Service Chairman report to the Division Chief and Director of Hospital Services, in turn.

Appointment Systems

Appointment systems at WHMC are currently decentralized by clinical specialty and appointment logs or schedules are maintained manually. Policy decisions regarding clinic appointments are generally the responsibility of the individual department chairman.

Depending on the size of the department, staffing of the appointments function for each clinic ranges from several full time positions to one part time position. In clinics which do not require a full time appointments clerk, the schedules of two or more small but similar clinics may be maintained by the same individual(s), or the clerk may assist in other administrative duties such as patient reception. In situations where appointments for several clinics are scheduled by the same appointments desk, the reception area is also usually shared. All appointment desks are located in, or adjacent to the reception areas of the clinic(s) which they support.

The general sequential steps a patient must take to obtain an

appointment at WHMC are presented in the procedural model depicted in Figure 1. Appointment clerks are trained in basic triage information relevant to the particular clinical specialty which they support. Because of the decentralized structure, the training required is not significant in length. If a patients health needs require urgent attention, or the clerk is not sure of a situation, the matter is elevated to the clinic supervisor or a direct care provider. After the appointment clerk has determined the patient's medical complaint can be addressed in that particular clinic, the next available appointment date is determined. If the patient is unable to meet that date for some reason, an attempt may be made to find another date. Once the appointment date has been established, the appointment clerk obtains the relevant patient demographic information necessary for scheduling the appointment and informs the patient of the clinic location.

Health care beneficiaries are not required to accomplish registration at military medical facilities per se. Eligibility is instead established through beneficiary "status", and the issuance of a Department of Defense identification card. The most common categories of beneficiary status include; Active Duty Military, Dependent of Active Duty Military, Retired Military, Dependent of Retired Military, and Dependent of Deceased Military. As an appointment is being scheduled, the status of the patient requesting the appointment is determined by the clerk. If the

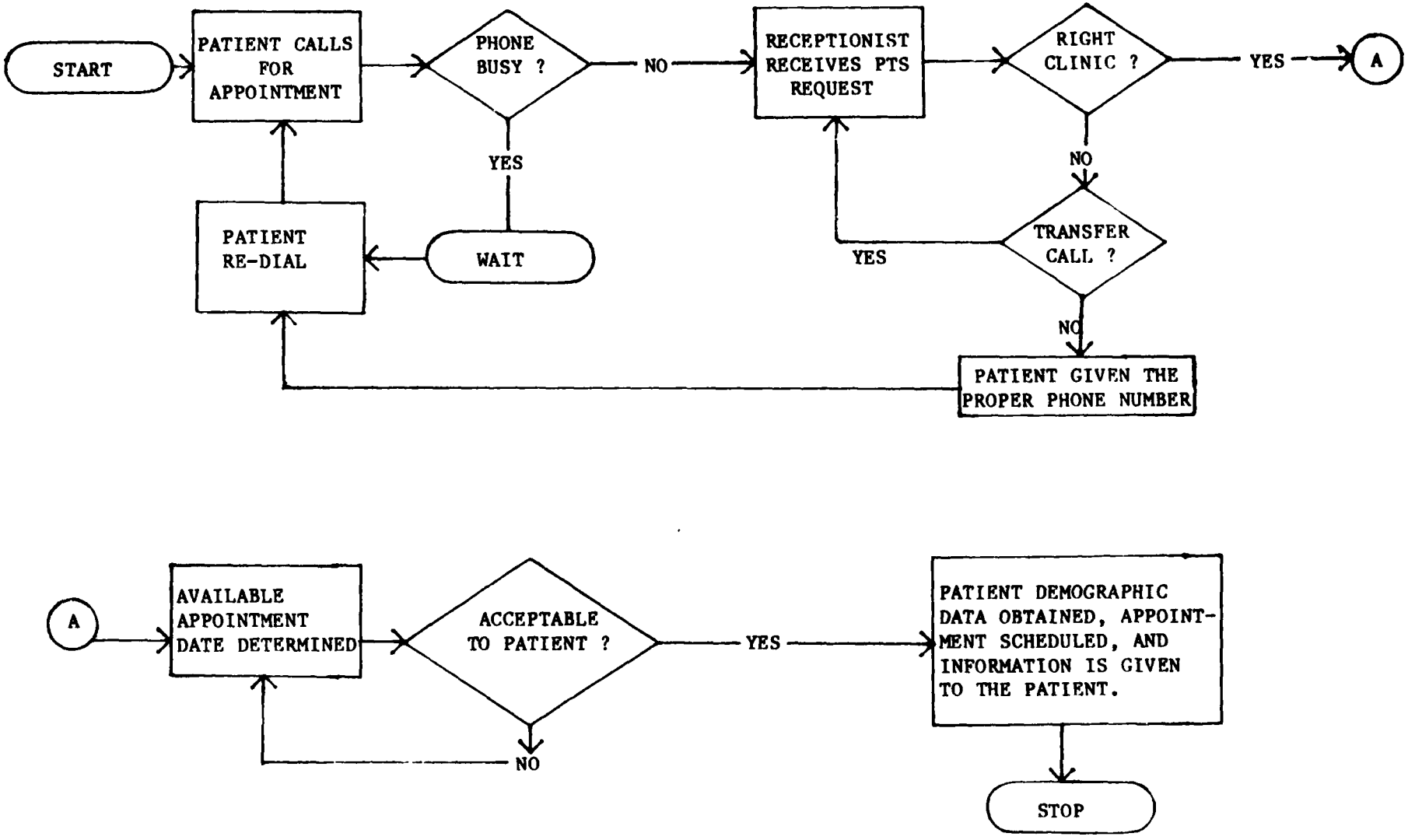


Figure 1. Appointment Flow Sequence: Wilford Hall Medical Center

patient is an authorized beneficiary but has never established a military medical treatment record, he or she is instructed to report to the Patient Affairs Office prior to the scheduled appointment time to establish a record. Patient eligibility of all patients must be confirmed upon arrival at the medical facility by presentation of the identification card. In addition, patient eligibillity is checked on a percentage basis through the Defense Enrollment Eligibility Reporting System (DEERS). DEERS has been developed by the Department of Defense (DoD) to support the management of DoD health resources, and to help reduce fraud and misuse of Uniformed Services benefits.

Normal appointment desk hours of operation for all clinics are from 7:30A.M. to 4:30 P.M., Monday through Friday. The major exception to these hours is the Urgent Care Clinic. This clinic provides patients with medical advice and attention for those medical problems which are acute and cannot wait for scheduled appointments in other clinics. Same-day appointments may be scheduled for the Urgent Care Clinic from 4:00 P.M. to 11:00 P.M., Monday through Friday, and 7:30 A.M. to 11:00 P.M., on Saturdays, Sundays, and Federal Holidays. Although appointment desks are open during the hours addressed above, in some clinics patients can only call to schedule certain types of appointments on one or two days during the week. This situation exists because the available number of the particular type of appointments is limited, and the books are filled in one or two days. The manual appointment logs are generally opened for two to four week

intervals. Once this interval of appointments are filled, all patients except those with urgent problems are required to call back on the specified date when the next block of appointments will be made available.

Methods used to inform the appointment desks of provider availability for future scheduling varies by clinic. In some clinics a detailed schedule is prepared which identifies each provider's work activities for the entire month. Other clinics identify provider availability by exception, and only list the duties and times that provider's will not be available in the clinic. Those clinics which organize providers into teams prepare availability schedules according to team designations rather than individual provider. Regardless of the method utilized, the chairman of the department must review and approve the schedule before it is received by the appointment clerks. Patients may request an appointment with a specific provider if the provider is available and has an opening.

Telephone communications equipment for all appointments desk consist of Northern Telecom model SL-1, multi-station, push-button instruments with hand held receivers. Depending on the size of a clinic, the number of phone lines dedicated to the appointments desk may range from three to twelve. One number is published as the appointments number for each clinic, and as calls reach the station they are distributed to available lines through a rotary switch. At the present time there are no dedicated lines for patients to utilize when it is necessary to cancel an appointment.

In most clinics at least one appointments desk phone line is dedicated to in-house communications to and from other clinics and services. At the present time, none of the telephone instruments have call sequencer, automatic call hold, or recorded message capabilities.

In addition to the telephone equipment discussed above, two other methods of obtaining appointments are available for patients in some clinics. These methods include in-house telephones located in the reception area of some clinics, and written request by mail. In those clinics which have the in-house phone capability, the majority of the patients utilizing this service do so for the purpose of scheduling return or follow-up appointments. Utilization of the mail-in appointment request is neither greatly emphasized by the staff, nor used by patients at the present time.

The unique descriptive information for each individual clinic appointment system that was observed for the purpose of this research effort is presented in Table 1.

Clinic Access

Patient access to the WHMC Health Care System is structured to meet patient needs progressively through primary, secondary, and tertiary levels of care. Except for cases that require urgent or emergency response to a defined medical problem, patients enter the system at the primary level and are referred to other clinical specialties and sub-specialties as required. Patients referred by physicians at other medical facilities are scheduled for appropriate clinics by their referring physician.

TABLE 1

WILFORD HALL USAF MEDICAL CENTER
APPOINTMENT SYSTEM

Clinics	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Schedules Submitted	Appt. Log Intervals
Pediatrics	*	2.0	2	5	2.79	yes	4 Weeks
Primary Care	*	2.0	2	3	1.53	yes	2 Weeks
Obstetrics & Gynecology	*	4.0	4	6	1.24	yes	4-6 Weeks
General Internal Medicine	*	2.0	2	2	1.50	yes	4 Weeks
General Surgery	**	1.0	2	8	2.78	yes	1 Week
Orthopedics	***	1.0	1	3	4.30	yes	1 Week

* 7:30 A.M. to 4:15 P.M., Monday through Friday.

** New patient appointments made only on Tuesday.

*** New Patient appointments made only on Friday.

As a general rule, all clinics at WHMC are open from 7:30 A.M. to 4:30 P.M., Monday through Friday. The major exception to these hours is the Urgent Care Clinic. This clinic provides patients with medical advice and attention for those medical problems which are acute and cannot wait for scheduled appointments in other clinics. Hours of operation for the Urgent Care Clinic are: 4:30 P.M. to 11:00 P.M., Monday through Friday; and 7:30 A.M. to 11:00 P.M., on Saturdays, Sundays, and Federal Holidays. Selected descriptive data related to the clinics being observed in this study are presented in Table 2.

Once a patient has obtained an appointment for a particular clinic via the appointments process addressed above, he or she reports to the appropriate clinic location at the time specified. The general patient flow sequence of an outpatient clinic visit at WHMC is presented in Figure 2.

Patients are usually encouraged to report to the clinic ten to fifteen minutes before the scheduled appointment time. This process allows adequate time for patients to check-in through the reception desk, assure medical records are available, and the taking of any weights and measures that might be routinely requested by the provider prior to the actual patient-provider encounter. Unique clinic situations may require that patients report as much as forty-five minutes early in order that necessary diagnostic procedures are available.

Inpatient and outpatient medical treatment records are maintained separately for military health care beneficiaries due

TABLE 2

CLINIC OPERATIONS: WILFORD HALL USAF MEDICAL CENTER

Clinics	Staff Physicians	Support Staffing Ratio (Medical Only)	Exam Room Ratio	Clinic Hours	Average Visits Per Month	Physician Productivity Ratios (Visits / Available Days)
Pediatrics	16.5	.36	1.0	*	1,768	12.05
Orthopedics	6.0	.66	1.0	**	1,967	13.32
General Internal Medicine	6.0	.41	2.0	*	1,767	6.55
General Surgery	7.0	.71	2.0	***	1,559	8.69
Obstetrics & Gynecology	7.0	1.57	2.0	*	3,580 ****	12.15
Primary Care	3.0	1.66	1.0	*	5,520 ****	20.92

* 7:30 A.M. to 4:15 P.M., Monday through Friday.

** 7:30 A.M. to 4:15 P.M., Monday through Thursday.

*** 7:30 A.M. to 4:15 P.M., Monday, Wednesday, Thursday; 7:30 A.M. to 12:00 M., Tuesday and Friday.

**** Average visits per month includes visits provided by Nurse Practitioners and Physician Assistants.

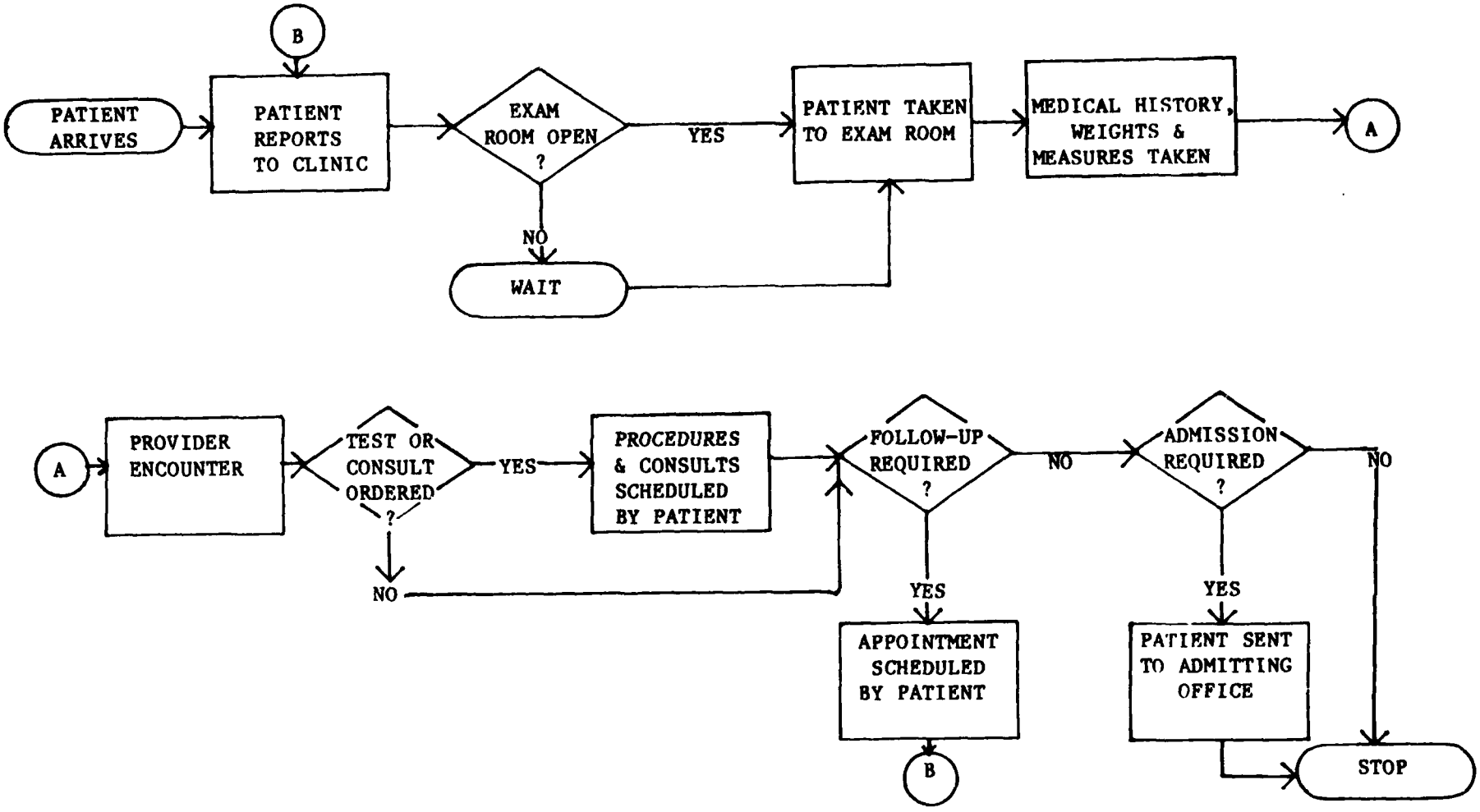


Figure 2. Clinic Flow Sequence: Wilford Hall Medical Center

to the traditional mobility of the military population. Inpatient medical records remain at the facility which provides the episode of care, and only a summary of that care is included in the outpatient record. When military beneficiaries are transferred, their outpatient treatment record (including a summary of any inpatient care) goes with them. If detailed information regarding inpatient treatment at a previous installation is needed, the provider at the gaining installation may request copies of the entire inpatient record be forwarded.

Outpatient medical treatment records are stored in a centralized Outpatient Records Section (ORS) at WHMC. Records are distributed to requesting clinics via a manual delivery system. A copy of each clinic's manual appointments log is sent to the ORS prior to the actual day of appointments. On the evening before the scheduled appointment date, records are pulled and delivered to the appropriate clinic destination. If a patient schedules a "same day" appointment or is a "walk-in", the patient is instructed to pick up his or her record at the ORS prior to reporting to the clinic. A "runner" is sent to the ORS to obtain records for those patients whose medical condition precludes their ability to obtain their own record.

At the conclusion of the Patient - Provider encounter, the provider instructs the patient regarding any ancillary procedures, special studies, referrals, consults, or follow-up visits that may be required. Appropriate request forms are prepared by the provider, and the patient is given instructions to report to the

necessary location to obtain these services. If appointments are required for any of these services, it is the patient's responsibility to schedule them. If the physician determines that the patient should be admitted (same day admission), the physician contacts the appropriate inpatient ward to determine if a bed is available. If a bed is available, the provider informs the unit nurse of the pending admission, and instructs the patient to report to the Admissions Office. Patients who are scheduled for admission at a later date should be instructed to report to the Admissions Office to accomplish pre-admission procedures.

Clinic staffing at WHMC is structured to be consistent with the progressive care concept of the overall system. The physician is at the apex of the health care delivery team in all clinical specialties and sub-specialties. Residents and Fellows actively participate in supervised clinical practice through the sixteen medical residency, and thirteen medical fellowship programs conducted at WHMC. In clinics which provide high volumes of health care at the primary level, Nurse Practioners and Physician Assistants provide invaluable relief to physicians by treating common medical problems. These providers have completed significant advanced training and demonstrated competent skill and judgement in identifying and treating common medical problems. All care provided by these individuals is accomplished under the direct supervision and review of physicians. Larger clinical specialties also have Registered Nurses (RN's) assigned as part of the delivery team. These RN's provide a vast range of service

which may include providing patient education, administering medications, or conducting special procedures, to name a few. Rounding out the clinical health delivery team are medical technicians, administrative receptionists, appointment clerks, secretaries, and volunteers.

Admissions and Dispositions

The Admissions and Dispositions Office (A&D) at WHMC is responsible for all admission and disposition functions, including pre-admissions. A&D activities are conducted in a centralized location adjacent to the main entrance at WHMC. Appropriately, the A&D Office is open twenty-four hours a day, seven days a week. In addition to the responsibilities associated with normal A&D functions, the office is also responsible for the operation of the hospital information desks. The A&D Office is organized under the Assistant Administrator, Patient Affairs within the WHMC management structure.

Authorized staffing for the A&D Office includes twenty full time positions and several volunteer positions. Volunteers are utilized to assist in the operation of the information desk. A&D Office staffing levels are presented in Table 3.

During calendar year 1982, the A&D office processed over 22,000 patient admissions. These admissions equated to an average daily patient load of 595, with an average patient length of stay of 9.8 days. Bed capacity during this period fluctuated between 650 and 750 beds as a result of the major construction project which included the renovation of all inpatient units.

TABLE 3

WILFORD HALL MEDICAL CENTER
ADMISSIONS OFFICE STAFF

Noncommissioned Officer In Charge	1
Shift Supervisors	2
Admitting Clerks	13
Information Desk Receptionist	3
Total	20

Patient tracking and accountability is provided by an Air Force developed automated system, the Medical Administrative Management System - Revised or MAMS-R. This system tracks patients from pre-admission through disposition, and provides a number of patient management documents including Admissions and Dispositions List and patient billing information.

The general patient admission flow sequence that is followed at WHMC is presented in Figure 3. Patient admission data collected for this project will be presented for analysis under the Comparison of Admission Systems.

Once a physician has determined the necessity for a patient to be admitted, the admissions process begins. The first variable encountered involves the decision of when to admit the patient. When the decision is made to admit a patient on the same day, the provider contacts the appropriate medical resident on call and determines if a bed is available. If a bed is available, the medical resident coordinates the planned admission with the

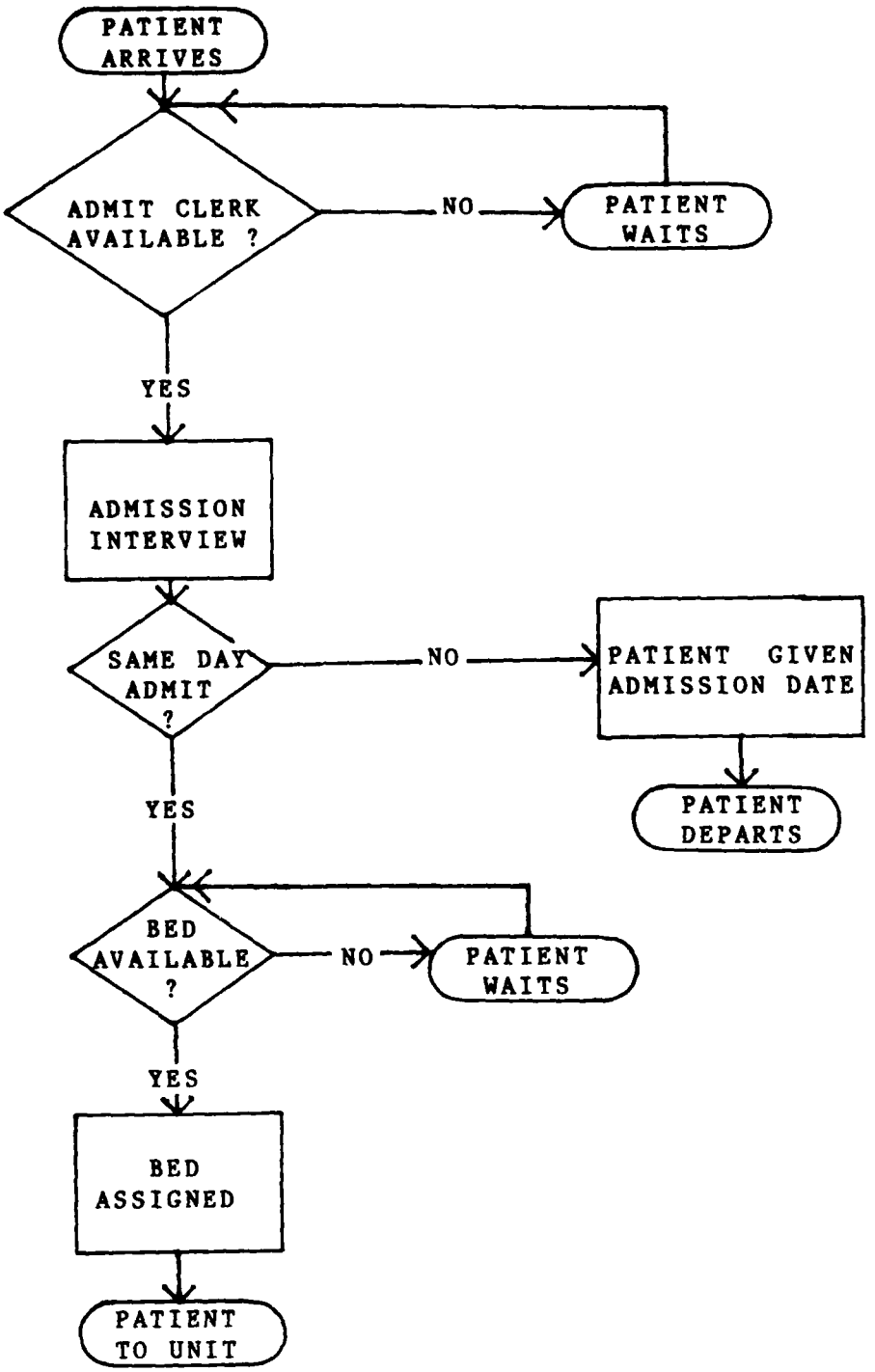


Figure 3. Admission Flow Sequence:
Wilford Hall Medical Center

appropriate inpatient unit nurse, and the nurse "reserves" the bed for that patient. The provider then initiates the necessary admission authorization documents and directs the patient to the A&D Office. If a bed is not readily available but the physician feels the patient should be admitted that day based on medical necessity, the patient is instructed to report to the A&D Office for admissions processing. At this point, the A&D receptionist notifies the medical resident on call for the applicable service and requests that a bed be located. The resident is then responsible for contacting staff physicians of that service and alternative service to locate bed space. The A&D Office proceeds with the initiation of admissions documentation while waiting for a response from the medical resident. After bed space has been located, the patient is assigned to the inpatient unit.

When the physician decides to admit a patient at a later date, the admissions authorization document is prepared and the patient is instructed to report to the A&D Office for pre-admission processing. During pre-admission processing, all necessary documentation is prepared with the exception of register number, patient identification band, and actual bed assignment. The patient is informed of the appropriate time and date to return for admission to the facility. On the scheduled date of admission, the patient reports to the A&D Office for what should be a brief stop to complete the remaining admitting actions. If unscheduled admissions with higher medical priority are assigned to beds identified for pre-scheduled patients, attempts are made to notify

the pre-scheduled patients of the delay and these patients are placed on standby or re-scheduled for a later date.

The patient discharge sequence at WHMC is a three step process. Once a physician decides that a patient is to be discharged, the patient clearing process begins. The three main stops in patient clearing include: the inpatient unit, the A&D Office, and the Business Office. After a patient clears the inpatient unit they are allowed to go to the A&D Office and Business Office on their own. Under this procedure, the hospital has no control over the patients likelihood of reporting to A&D. This results in approximately ten patients leaving the hospital each day without clearing either A&D or the Business Office.

Although the clearing process is standardized for all services, no set hour or time has been established as a recommended or desired discharge time. This results in sporadic discharges throughout the day and into the evening hours.

Ochsner Clinic

General

The Ochsner Clinic is a private, multi-specialty group practice located in New Orleans, Louisiana. Ochsner Clinic works very closely with the Alton Ochsner Medical Foundation, a separate organization, in providing a comprehensive program of health services, medical education, and medical research. Through the combined efforts of the two organizations, the Ochsner complex has developed into a renowned health care delivery system primarily

serving the Gulf States region of the United States and countries in Central and South America.

Last year, the staff of the Ochsner complex provided patient care through over 280,000 outpatient visits and 18,000 inpatient admissions. The Ochsner Clinic is staffed by 180 staff physicians, which also serve as the attending medical staff of the Ochsner Foundation Hospital, and approximately 720 full time employees. The Alton Ochsner Medical Foundation has a staff of approximately 2,500 full time employees and 182 medical residents and fellows.

The medical staff provides health services in thirty-six clinical specialties and related sub-specialties. Each of the specialties and sub-specialties are organized as Departments under the Medical Director of Ochsner Clinic, and Associate Medical Directors, for Medicine and Surgery.

Appointment Systems

The Appointment System at Ochsner Clinic is centralized for all clinical specialties and sub-specialties except; Pediatrics, Obstetrics and Gynecology, ENT, Cardiology, Psychiatry, and Oral Surgery. Appointments for all clinical specialties may be obtained either by phone or written request. The main appointment desk is located on the eleventh floor of the clinic building, and is separated from all patient clinics. Appointment desks for those clinic specialties which schedule their own appointments, are located in the respective clinics. All appointment logs or

schedules are maintained manually at the present time. However, development of an automated appointment scheduling system is currently ongoing, with implementation expected in the Fall of 1983. Policy and guidance for appointment system operations and staffing are the responsibility of the Medical Director and Administrative Director of Ochsner Clinic, and are outlined in the Ochsner Clinic Provider's Handbook.

The main appointment desk is currently staffed with twenty-nine full time employees. The Pediatrics appointment desk is staffed with four full time employees, and the OB/GYN desk is staffed with two full time employees. The staffing and operation of the other decentralized appointment desk, identified above, were not observed. A breakdown of the staffing for the Central Appointment desk is presented in Table 4.

TABLE 4

OCHSNER CLINIC
CENTRAL APPOINTMENT STAFFING

Appointment Desk Supervisor	1
Team Leaders	2
Appointment Receptionist	16
Triage Nurse	1
Clinic Check Receptionist	5
Data Entry Clerks	4
Total	29

The Main Appointment Desk Supervisor is responsible for the staffing and supervision of all appointment desk functions, and

providing coordination between other clinical activities regarding the appointment desk. In addition to the supervisor, a Registered Nurse is assigned to the appointment desk to serve as a triage consultant for the receptionist.

The appointment receptionists assigned to the main appointment desk are divided into two teams of equal size. Each team staffs one of two, eight station carousels. One carousel is designated to support Surgery specialties and the other supports Medicine specialties. The two teams are capable of operating either carousel, and in fact rotate from one to the other to maintain proficiency. The appointment receptionists for Pediatrics and OB/GYN are located in separate rooms in their respective departments, and perform their functions at wall mounted work stations instead of carousels.

The Check Sheet receptionists are located in the same room as the Appointment Receptionists. However, they perform their duties at a separate carousel designated for Check Sheets.

The Check Sheet is a term used at Ochsner Clinic to identify the coordination of any consultations and/or diagnostic evaluations and procedures requested by providers. When a provider determines that these services are necessary for a patient, a written request appropriately named the "Clinic Check Sheet", is prepared by the provider. The Check Sheet receptionists are contacted by the clinic and the requested services are scheduled in proper sequence depending on which test are needed. Once scheduling is completed, clinic personnel

instruct the patient where and when to report for particular services, and what time to return to the initiating provider's office after the diagnostic procedures and/or consults are completed. The intended purpose of this process is to increase clarity of provider requests, eliminate patient "shuffling", and reduce lengthy waiting lines in ancillary departments and other clinics.

The normal hours of operation for all appointment desks are from 8:00 A.M. to 5:30 P.M., Monday through Friday, and 8:00 A.M. to 12:00 noon on Saturday. The manual appointment books are generally opened for three month intervals, with a new month added at the end of each month. The most distant month is primarily used to schedule referral patients whose personal schedules prevent earlier appointments, and return or follow-up visits for patients involved in treatment or research which necessitates longer intervals between appointments.

The general sequential flow of the appointment scheduling process at Ochsner Clinic is displayed in the Figure 4. Due to the wide range of clinical specialties supported by the main appointment desk, receptionists at this desk receive assistance in the triage of patient medical problems from the Triage Nurse and a set of triage checklists which were developed by each of the clinical specialties. These resources, coupled with each receptionist's own experience in determining the appropriate service, result in expedient and accurate scheduling of patient appointments. The appointment receptionists for the Pediatrics

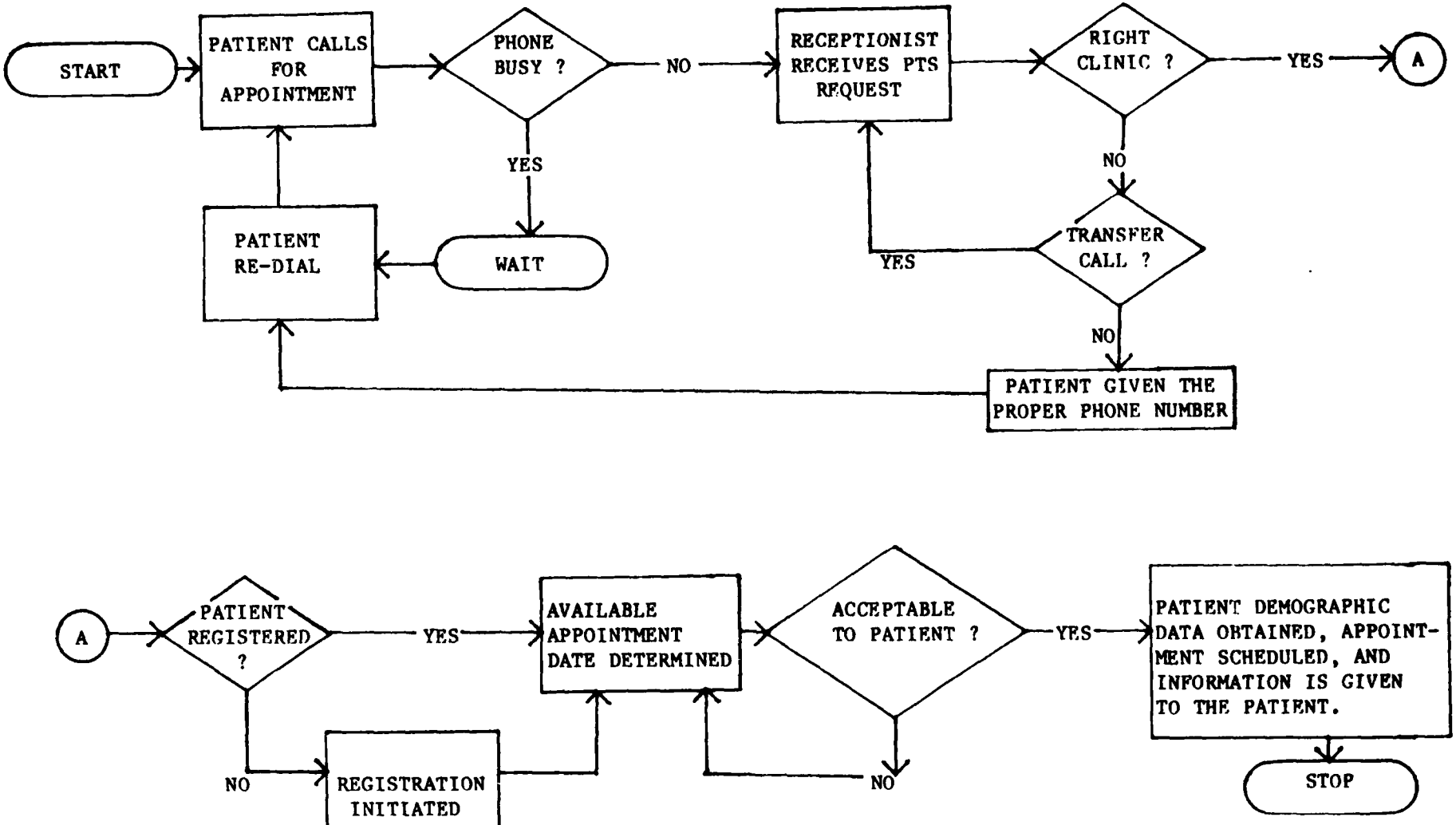


Figure 4. Appointment Flow Sequence: Ochsner Clinic

and OB/GYN clinics are trained in triage information relevant to the particular clinical specialties and sub-specialties which they support and also have triage checklists available.

Once an appointment receptionist has identified the correct clinic in which a patient should be seen, the receptionist determines if the patient has been previously registered at Ochsner Clinic. If the patient has been previously registered, the receptionist informs the patient of the next available appointment date, obtains the necessary patient identification demographics, informs the patient of the clinic location, scheduled time and date, and provider's name. If the patient has never been registered at Ochsner Clinic, the receptionist initiates a patient registration form, collects necessary patient demographic information, and instructs the patient to report to the Patient Registration Desk thirty minutes prior to the scheduled appointment time on the date of the visit. A personal medical history form is mailed to all patients that are scheduled for Medicine specialties. Patients are instructed to bring the form with them on the day of their appointment.

The method utilized to inform the appointment desks of provider availability schedules is uniform for all clinical specialties at Ochsner Clinic. Each physician must file a monthly work schedule with the chief nurse in the department. The schedule is reviewed by the chief of the department and forwarded to the Medical Director for review. Once approved, the schedule is sent to the appointment desk and will be used as the source

document for scheduling providers. To alter the schedule, a provider must submit an appointment schedule change request through channels, to the Medical Director. If the change request is related to a meeting or travel, the provider must also attach a completed meeting and travel sheet describing the nature of the absence. Appointment schedules will only be altered when written approval is received from the Medical Director.

Telephone equipment for the entire Ochsner complex is provided through a ROLM Telecommunications System. The Main Appointment Desk and Clinic Check are also supported by an Automatic Call Distribution (ACD) System produced by the same company. Each station on these carousels has instruments equipped with headsets. This feature provides more freedom of movement for the receptionist.

Incoming calls are automatically distributed to the stations by the ACD system. Once all sixteen appointment desk stations are busy, the ACD places all additional incoming calls on hold, in priority sequence. Calls placed on hold receive a recorded message indicating that the caller has reached the appointment desk and that all available lines are busy. When a station becomes available, the ACD distributes the next appropriate call to that station. Calls that remain on hold for more than sixty seconds receive a second recording. The ACD system is connected to the main electronic switch for the entire Ochsner complex and allows a relatively large number of calls to be "stacked" in sequence.

The ACD system also has the capability to provide real time monitoring and cumulative management data of system performance. A terminal installed in the supervisor's office allows the supervisor to monitor system capacity during the day, and produces hard copy reports which display a wide range of performance data including information regarding the number of calls received, the number of calls answered, average delay time (hold) per call, average work time per call, and others. In addition to cumulative reports, the system also allows interval analysis such as volume by hour or half hour.

Another valuable report prepared by the appointment desk is the "First Admits" report. This document reports the lead time for the next available appointment in each clinic. The report is prepared on Thursday of each week and sent to several offices in clinic administration. The information provided enables management to determine if any potential bottle necks are developing in a particular specialty or several specialties. Since the data is reviewed on a weekly basis by the Board of Management, the Clinic governing body, and the Clinic Administrator, potential problems can be identified and corrected quickly.

The Pediatrics and OB/GYN appointment desks stations are equipped with four and two Multiplex (multiple line) instruments respectively. These stations are not connected to the ACD system at the present time and do not have any type of call sequencer capabilities.

Other patient and provider considerations developed for the appointment system include the following. Dedicated lines are available at all appointment desks for internal communications between departments. Direct lines are installed in the main lobby to facilitate patients needing to schedule follow-up appointments requested by providers. Two incoming lines to the Ochsner Clinic operator have been designated as "hot lines" for patients and referring providers attempting to call the appointment desk by long distance. Calls received on these lines are switched to the appropriate appointment desk and override local incoming calls.

The unique descriptive information for each appointment desk relevant to this research project is presented in tabular format in Table 5.

Clinic Access

Although Ochsner Clinic is a major tertiary medical center, patients can enter the system at either the primary, secondary, or tertiary level. Both patients and referring physicians may schedule visits to specific clinical specialties as desired.

All specialty and sub-specialty clinics at Ochsner Clinic are open to receive patients from 8:00 A.M. to 5:00 P.M., Monday through Friday, and from 8:00 A.M. to 12:00 noon on Saturday. Descriptive data for clinics observed in this research effort are displayed in Table 6.

The general patient flow sequence of an outpatient visit at Ochsner Clinic is presented in Figure 5. On the date of the

TABLE 5

OCHSNER CLINIC
APPOINTMENT SYSTEM

Clinics	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Schedules Submitted	Appt. Log Intervals
Pediatrics	**	4.0	4	8	1.24	yes	2 Months
Primary Care	*	Central	-	-	1.14	yes	3 Months
Obstetrics & Gynecology	**	2.0	2	4	1.40	yes	3 Months
General Internal Medicine	*	Central	-	-	1.19	yes	3 Months
General Surgery	*	Central	-	-	1.20	yes	3 Months
Orthopedics	*	Central	-	-	1.42	yes	3 Months
Central Appointment Desk	*	30	16+	16 ***	-	yes	3 Months

* 8:00 A.M. to 5:30 P.M., Monday through Friday, and 8:00 A.M. to 12:00 M., Saturday.

** 8:00 A.M. to 5:30 P.M., Monday through Friday.

*** Central Appointment phone lines are tied to an electronic rotary switch with a 4,000 line capacity.

TABLE 6

CLINIC OPERATIONS: OCHSNER CLINIC

Clinics	Staff Physicians	Support Staffing Ratio (Medical Only)	Exam Room Ratio	Clinic Hours	Average Visits Per Month	Physician Productivity Ratios (Visits / Available Days)
Pediatrics	14.0	.50	2.0	*	1,933	13.74
Orthopedics	6.0	1.16	2.0	*	1,360	16.68
General Internal Medicine	5.0	1.00	2.0	*	651	6.70
General Surgery	7.0	1.00	2.0	*	835	11.10
Obstetrics & Gynecology	7.0	1.71	2.0	*	2,088	17.36
Primary Care	5.0	1.20	2.0	*	694	NA

* 8:00 A.M. to 5:00 P.M., Monday through Friday, and 8:00 A.M. to 12:00 M., Saturdays.

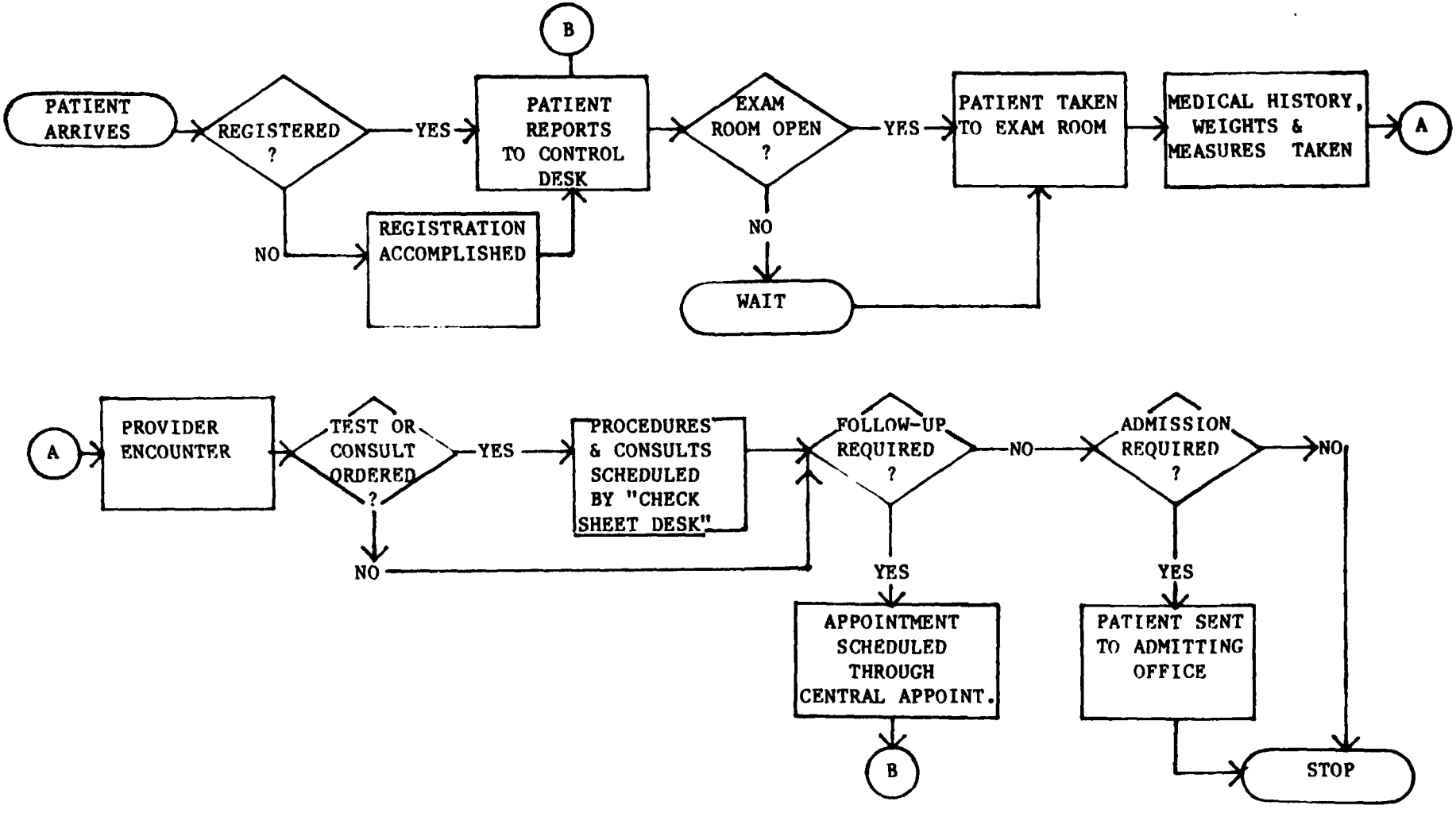


Figure 5. Clinic Flow Sequence: Ochsner Clinic

appointment, new patients are directed to make brief stops at the Registration Desk to complete registration requirements, and a Financial Secretary for explanation of charges, billing, and insurance filing procedures. Once registered, patients report directly to the Control Desk of the appropriate clinic they are scheduled to visit. The Control Desk is the designated patient reception point for each individual clinical specialty. On all subsequent visits to the clinic, patients are directed to report directly to the designated Control Desk.

Upon arrival at the Control Desk, patients are checked in by a receptionist. The receptionist verifies the availability of the patient treatment record and notifies the physician's nurse or medical assistant that the patient has arrived. If a provider exam room is open, the patient may be called to the room immediately. If a room is not available the patient is asked to be seated in the waiting room. When an exam room becomes available the provider's nurse or medical assistant goes to the waiting room and escorts the patient to the room. In most situations the nurse or medical assistant records any necessary weights and measures once the patient is in the exam room.

Patient medical records contain both inpatient and outpatient treatment history at Ochsner Clinic. Patients referred to Ochsner Clinic by their family physician may request that a report of the visit be forwarded to the referring physician.

Medical records are stored and controlled by a central Record Room and are distributed throughout the facility via an automated

records handling system. The Records Room is also responsible for creating new records and maintaining medical records accountability. This requirement is accomplished through utilization of semi-automated tracking system which keeps track of individual records and their movement within the facility. Once a record is signed out to a particular clinic control desk, that clinic is responsible for the record during the remainder of that episode of care. If the record must be sent to another clinical specialty for consultation, the "home" desk attaches a routing slip to the cover indicating that the record should be returned to the home desk, and notifies the Record Room of the current location. When the patient visit or episode of care is completed the record is returned to the Record Room.

When the provider determines that diagnostic evaluations and/or consults with other specialties are necessary for a patient, a Clinic Check Sheet is prepared by the provider. The services requested on the Check Sheet are scheduled by the Check Sheet receptionist while the patient waits in the clinic waiting area. Once the requested procedures and visits have been scheduled, the patient is informed regarding where and when to report for these services. If the patient encounters any difficulty in completing the scheduled test and/or visits, he or she contacts the "home" Control Desk for assistance. Upon completion of all diagnostic procedures and consults the patient is scheduled for a review visit with the initiating provider. The results of the studies are reviewed and discussed with the patient

at this time, and a recommended treatment plan is developed. In the event a patient requires hospitalization at the Ochsner Foundation Hospital, a clinic nurse contacts the Hospital Admitting Office to reserve a bed for the patient.

Staffing of the clinical specialty and sub-specialty activities at Ochsner Clinic are organized in a very effective and efficient manner that results in a highly responsive health care delivery system. The medical staff is organized under the Medical Director of Ochsner Clinic, as discussed earlier. All clinic support personnel, both medical and administrative, are organized under the Administrative Director and Assistant Administrators. Medical support personnel for all clinics are functionally organized under an Assistant Administrator, and all administrative support personnel are functionally organized under two other Assistant Administrators. The demonstrated clarity of communication and coordination existing through this structure was most impressive.

The medical staff of Ochsner Clinic is assisted by a well defined mix of medical and administrative support personnel based on the level and volume of health care services provided in each available clinical specialty. Medical residents actively participate in providing patient care under the close supervision of the medical staff in General Internal Medicine, Orthopedics, General Surgery, Obstetrics and Gynecology, and Pediatrics. Medical support personnel assigned to the clinics include: Registered Nurses, Licensed Practical Nurses, Medical Assistants,

and Aides. Administrative support personnel assigned to the clinics include: Control Desk Receptionists, Medical Secretaries, and Appointment Receptionists.

Admissions and Dispositions

All admission and disposition functions at Ochsner Foundation Hospital are conducted through the Hospital Admitting Office. The Hospital Admitting Office is a part of the Ochsner Foundation Hospital rather than the Ochsner Clinic, and as such, it is organized under the administrative management structure of the hospital. The office is centrally located adjacent to the main lobby of the hospital and is open twenty-four hours a day. Pre-admissions are scheduled during the day between 8:00 A.M. and 6:30 P.M., Monday through Friday. The Admitting Office is also responsible for the staffing and operation of the hospital Information Desk.

Staffing for the Hospital Admitting Office consists of twenty-six full time employees, including the Director of Admissions. A breakdown of staffing utilization is presented in Table 7.

During 1982, the admitting office processed approximately 18,000 patient admissions. These admissions resulted in an average daily patient load of 402, and an average length of stay of 8.4 days. The bed capacity of Ochsner Foundation Hospital during this period totaled 544 beds.

TABLE 7

OCHSNER FOUNDATION HOSPITAL
ADMISSIONS OFFICE STAFF

Director of Admissions	1
Admitting Supervisors	2
Admitting Recptionist	16
Information Desk Receptionist	7
Total	26

The general patient admission flow sequence at Ochsner Foundation Hospital is presented in Figure 6. Patient admission data collected for this study will be addressed under the Comparison of Admission Systems.

Patient tracking and accountability is accomplished via an automated system. Bed status, patient admissions, pre-admissions, and dispositions are all processed by this system.

Once a physician determines that a patient should be admitted, clinic personnel notify the admitting office that a patient is being sent to the office for either admission or pre-admission. The patient is then sent to the Hospital Admitting Office, regardless of whether the admission is projected for that day or not. All patients reporting to the Admitting Office check in at the Information Desk in the main lobby. The patients give thereceptionist their name, and are directed to an Admitting Clerk to begin the admission or pre-admission. If all Admitting Clerks are busy, the patient is asked to be seated in the lobby until a clerk is available.

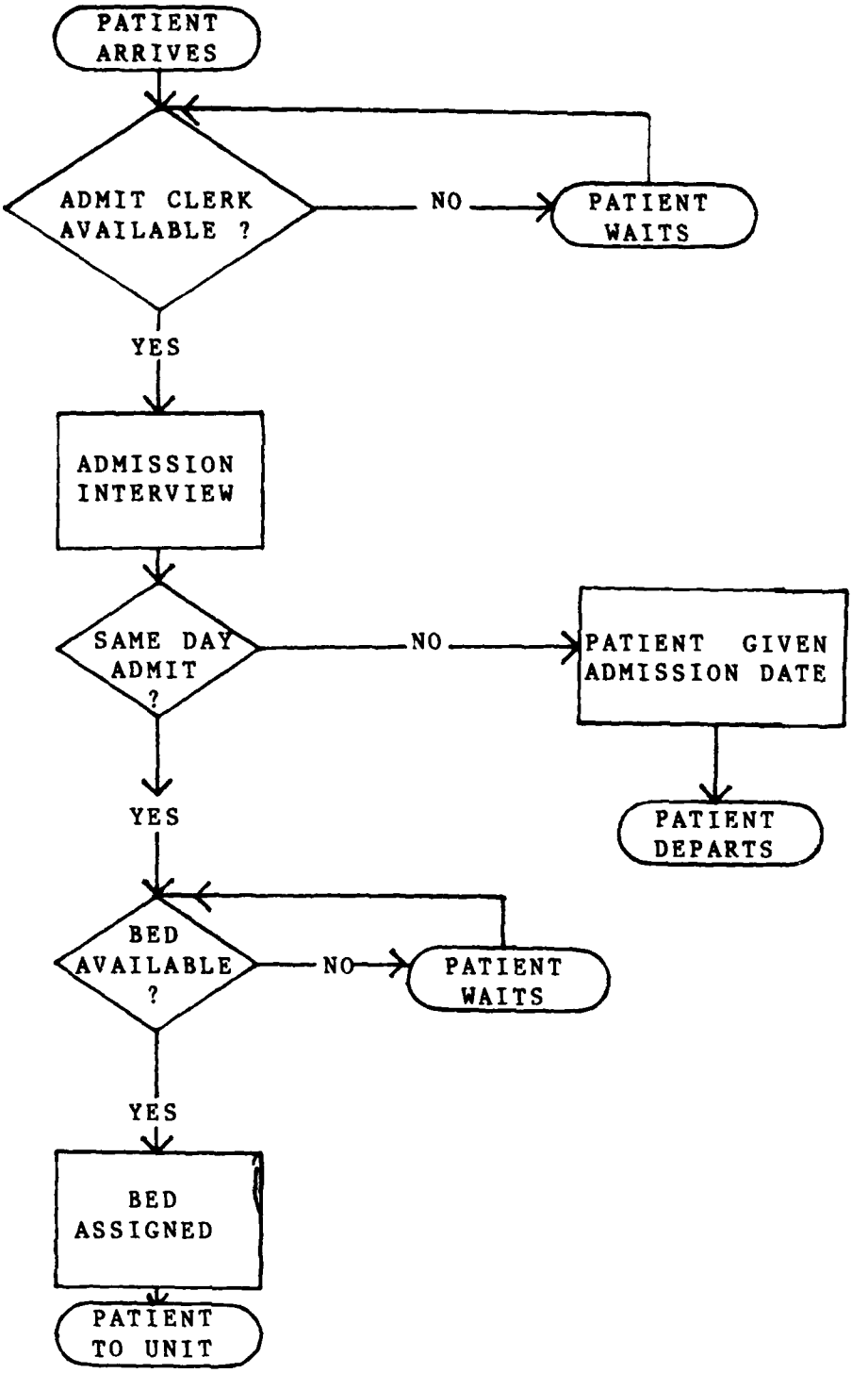


Figure 6. Admission Flow Sequence: Ochsner Foundation Hospital

The Admitting Clerk obtains all necessary patient demographic information and completes registration documents for all patients being admitted for the first time. Registration is not required except during the patient's first admission to the hospital. If the patient is to be admitted on the same day, the clerk identifies an available bed from the computer and coordinates the bed assignment with the appropriate unit nurse. The patient is then assigned to the bed and the clerk prepares the patient register number, identification bracelet, imprint card, and directs the patient to a Financial Clerk to coordinate insurance and billing arrangements. Patients being admitted the same day, are then escorted to the inpatient ward.

Pre-admission registration includes all admission processing functions except bed assignment, registration number, imprint card, and identification bracelet. On the evening prior to the scheduled admission of a pre-admitted patient, a list of scheduled patients is generated by the computer, and the identification bracelet and imprint card are prepared for those patients. The only remaining procedures required on the day of admission are actual bed assignment and designation of patient register number.

The patient discharge sequence at Ochsner Foundation Hospital is a one stop process. After the patient or a patient family member clears the patient account at the Business Office and takes the receipt back to the ward, the patient is free to leave the facility. Physicians are requested to identify pending patient discharges early in the morning on the day of discharge, and

attempt to have discharges accomplished by 11:00 A.M. When the physician writes the discharge order, the information is input to the computer by ward personnel, and the patient is shown as a pending discharge. This action enables the Admitting Office to more accurately project bed availability for the day and expedites new admissions. Once the patient has cleared the Business Office and leaves the inpatient unit, a computer entry is made by the unit which identifies the patient discharge is completed. Once the room is clean and ready to receive another patient the system is updated to show the bed as being available.

Mayo Clinic

General

Mayo Clinic, Mayo Graduate School of Medicine, Mayo Medical School, and Mayo School of Health-Related Sciences, are the collective functions of the Mayo Foundation, a charitable nonprofit corporation located in Rochester, Minnesota. Working together, the collective functions of the Mayo Foundation conduct highly integrated programs of clinical practice, medical research, and medical education. Mayo Clinic, the medical practice function of the Mayo Foundation, is a private, group medical practice which provides health care services to patients in the local region, throughout the United States, and around the world.

Mayo Clinic does not own or operate inpatient care facilities. Instead, the Clinic is closely affiliated with two hospitals located in Rochester, Minnesota: Saint Marys Hospital (1,100

beds), and Rochester Methodist Hospital(800 beds). The medical staffs at both hospitals are composed entirely of physicians from Mayo Clinic. Although the three organizations are totally independent of each other, they are often referred to collectively as the Mayo Medical Center.

Approximately 1.5 million outpatient visits were provided by the Mayo Clinic staff in 1982. A combined total of almost 62,000 patients were admitted to Rochester Methodist Hospital (29,600) and Saint Marys Hospital (32,300), during the same period. The combined Medical Center staff of 13,425 personnel which provided these health care services is distributed as follows: Mayo Clinic, 7,435; Rochester Methodist Hospital, 2,380; and Saint Marys Hospital, 3,610. The above staffing figure for Mayo Clinic includes over 810 staff physicians, 740 medical residents, and 177 medical fellows. Patient care is provided in thirty-six clinical specialties and related sub-specialties.

Clinical specialties and sub-specialties are organized as departments, divisions, and sections at Mayo Clinic. The Board of Governors is charged with the overall responsibility for managing the professional activities of the institution. Under the authority of the Board of Governors, the development and administration of policy, plans, and programs for the major institutional functions are the responsibility of the Clinical Practice Committee, the Education Committee, and the Research Committee. Department chairmen are in turn, responsible for the activities of divisions and sections organized under their

departments. Division chairmen and section heads are thus responsible for coordinating the clinical practice, medical education, and medical research activities within their areas. Administrative Services are organized under the Department of Administration.

Appointment System

The appointment system at Mayo Clinic is organized into several sub-systems which include the Appointment Office, Section Appointments, Community Medicine Appointments, and the Central Appointment Desk. Each of these sub-systems are designed to accommodate specific aspects of patient access to Mayo Clinic, and will be described below. With the exception of the Central Appointment Desk, patients may contact each of these areas directly. Policy and guidance for the overall appointment system is the responsibility of the Appointment Systems Study Committee.

The Appointment Office is located on the first floor of the main clinic building. Normal hours of operation for the Appointment Office are from 8:00 A.M. to 5:00 P.M., Monday through Friday. Descriptive information regarding the appointment system for each of the clinical specialties observed for this research effort is presented in Table 8.

The Appointment Office is the initial entry point for all new patients and referring physicians seeking information, scheduling, or conformation of appointments in all clinical specialties and sub-specialties except for General Surgery and the Department of Community Medicine. The General Surgery section at Mayo Clinic

TABLE 8

MAYO CLINIC
APPOINTMENT SYSTEM

Clinics	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Schedules Submitted	Appt. Log Intervals
Pediatrics	*	3.0	4	4	1.51	yes	3 Months
Primary Care	*	3.0	4	4	1.18	yes	3 Months
Obstetrics & Gynecology	*	3.0	3	4	1.15	yes	3 Months
General Internal Medicine	*	4.0	4	4	1.37	yes	3 Months
General Surgery	*	-	-	-	-	-	-
Orthopedics	*	3.0	3	3	-	yes	3 Months

* 8:00 A.M. to 5:00 P.M., Monday through Friday.

does not schedule regular clinic appointments. Instead, General Surgeons are "on call" during normal clinic hours. When providers in other specialties consider sugery to be a possible course of treatment, the General Surgery section is called, and a Surgeon goes to the requesting provider's office to see the patient. The Department of Community Medicine will be discussed below.

Physicians wishing to refer a patient to Mayo Clinic can receive assistance from the Referring Physician's Service (RPS) provided by the Appointment Office, or they may contact the specific clinical section directly. The RPS function was established in 1980, and supports all clinical specialties and sub-specialties.

The normal sequence patients follow to obtain appointments in all specialties except the Department of Community Medicine, is presented in Figure 7. Appointment requests received by the Appointment Office are triaged by the receptionists to determine which medical specialty would be most appropriate to address the patients health care needs. All appointment receptionists receive training in medical terminology and anatomy to enable them to properly triage patient request. Once the proper specialty has been identified, appointment scheduling is accomplished according to the procedures discussed below.

The Appointment Office is directly involved in scheduling routine appointments for all Department of Internal Medicine

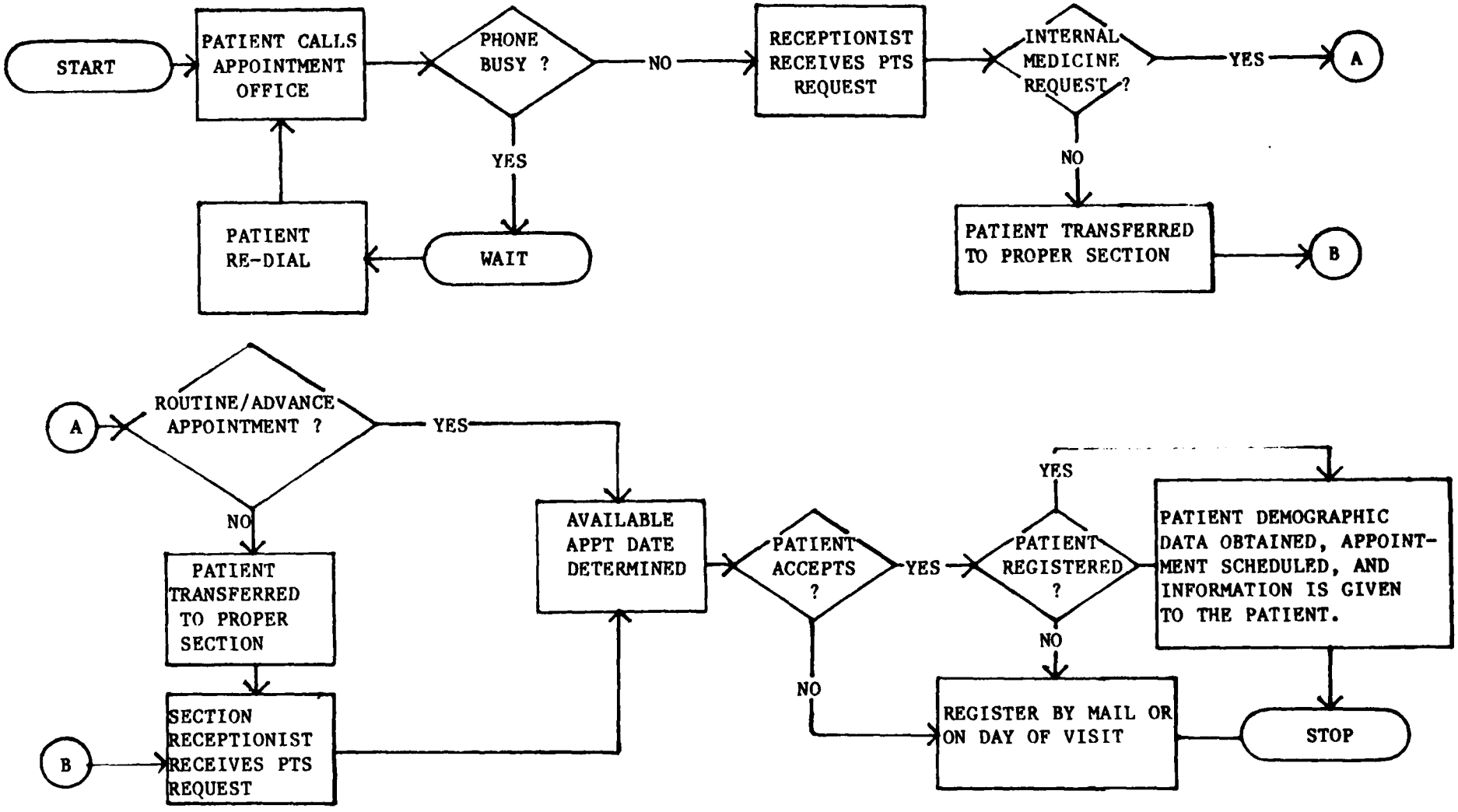


Figure 7. Appointment Flow Sequence: Mayo Clinic (Mayo Building).

specialties and sub-specialties. These appointments are scheduled by means of an automated scheduling system. Advanced appointments for the Department of Internal Medicine may be scheduled up to two years in advance on this system. The system displays appointment availability by clinical specialty, type appointment, and date in a calendar format. Patients are scheduled accordingly by date, type appointment, and clinical specialty, without designation of a specific physician and appointment time. Patients are instructed to report to the Clinic Admissions Desk at 8:00 A.M., on the date of their appointment.

Patient inquiries and requests for appointments in other Medicine specialties, and all Surgical specialties are directed to the appropriate department or section for scheduling. Appointments scheduled for these specialties and sub-specialties are designated by specialty, provider, date, type appointment, and time.

Section Advance Appointments are controlled and scheduled within each individual department, division, and section. Only the secretaries in the respective section may schedule these appointments. In addition to these appointments, the sections also schedule appointments identified as "Personal Directs". Personal Directs are a designated block of appointments which are directly controlled and scheduled by each individual physician. This procedure allows physicians a degree of flexibility for scheduling particular cases in which they may have some special interest.

Section Advance Appointments and Personal Directs for the Department of Internal Medicine are initially scheduled using manual appointment books within each section, and later entered in the automated scheduling system by personnel in the Appointment Office. Section Advance Appointments and Personal Directs for all other services are currently documented on manual appointment books. However, all appointment scheduling is expected to become automated in the future. Those sections utilizing manual appointment books maintain schedules that extend three months in advance.

The Department of Community Medicine is designed to accommodate the primary health care needs for the patient population of the City of Rochester, and Olmsted County, and six adjoining counties in Minnesota. Services included in the Department of Community Medicine are: Community Internal Medicine, Community Pediatrics, Obstetrics, Family Medicine, and Acute Illness Service. Community Medicine appointments are decentralized by service and scheduling is accomplished on an automated scheduling system. Appointments may be scheduled up to three months in advance. The sequential steps a patient must follow to schedule an appointment in the Department of Community Medicine are presented in Figure 8. Appointments are scheduled by calling the appointment desk of the specific service required. Appointments can be made in all Community Medicine services by calling the appropriate desk Monday through Friday, between 7:30 A.M. and 5:30 P.M.

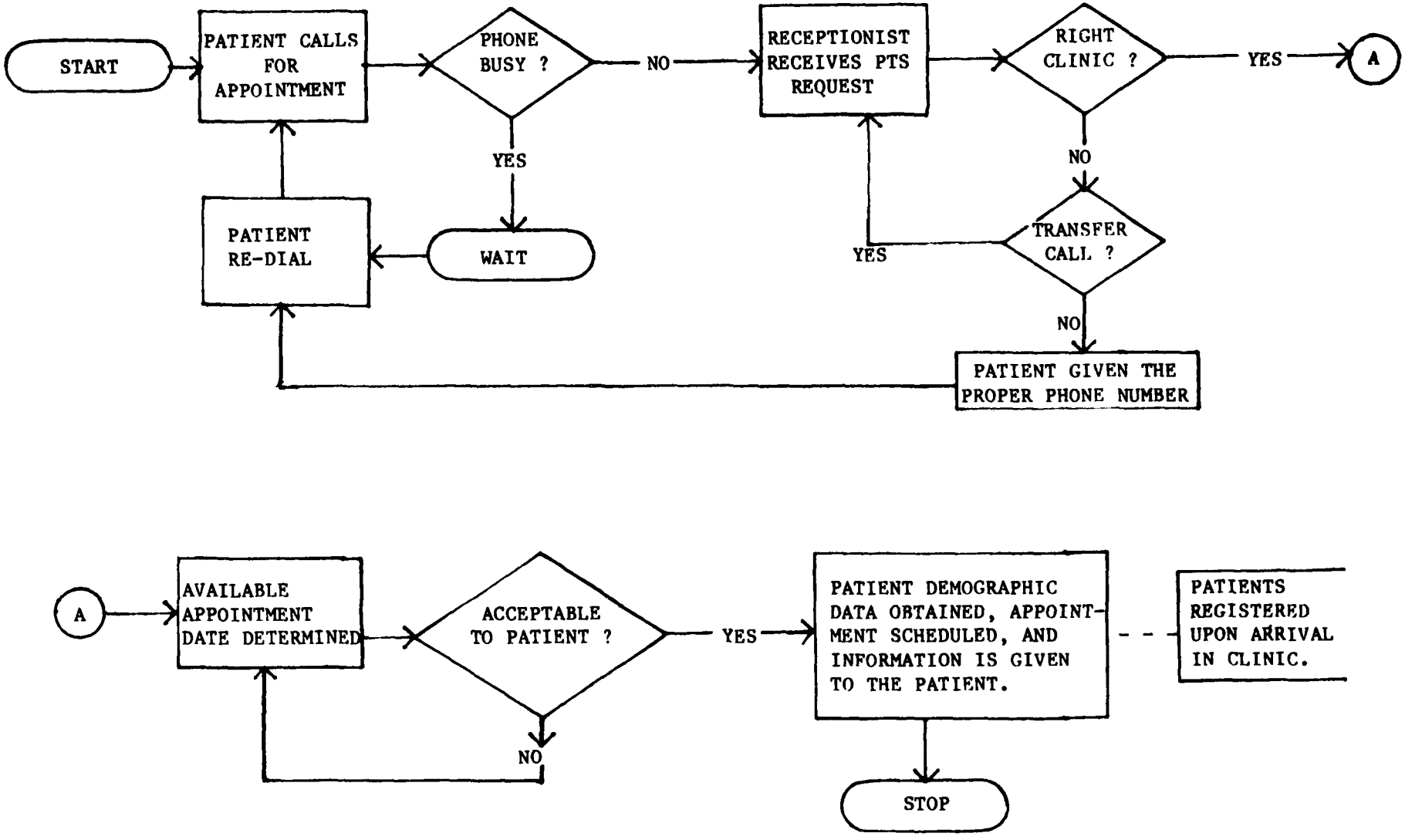


Figure 8. Appointment Flow Sequence: Mayo Clinic (Community Medicine Building)

Provider availability schedules for all clinical specialties and sub-specialties at Mayo Clinic are maintained by medical secretaries in each department, division, and section. The schedules are displayed in calendar format, and are utilized to determine provider availability for appointment scheduling in all services. The Appointment Office collects data from all departments except Community Medicine, and prepares a report showing projected appointment capacity for each specialty. The report is prepared and revised at the end of each week to display the most current four week projection.

Telecommunications capability for Mayo Clinic is provided by a Bell Centrex System. Phone instruments in the Appointment Office are multi-station, push-button devices with operator headsets. Incoming calls are distributed by a rotary switch. When all receptionists are busy, incoming calls receive a recorded message informing the caller of the delay and are placed in sequential hold. Calls placed in sequential hold are automatically distributed to the next available receptionist. Phone instruments for other appointment areas consist of multi-station, push-button devices with hand held receivers. These instruments do not have call sequencer and recorded message capabilities.

For those readers not familiar with the functional operations at Mayo Clinic, the name Central Appointment Desk (CAD) may be somewhat misinterpreted. At Mayo Clinic the CAD is responsible for scheduling appointments for the majority of the consults and/or diagnostic test and procedures requested for patients.

The CAD accomplishes this responsibility through the use of a sophisticated automated scheduling system which correlates the next available appointment time, the normal length of time required to accomplish each procedure, and the appropriate sequence in which requested services should be provided.

To request CAD scheduling services, the physician orders the necessary consults or procedures on a pre-printed form designated the Medical Service Record (MSR). All routinely requested consultations and diagnostic test are identified on the MSR by categories such as: Special Examinations, X-Ray Examinations, and Blood Test. To request specific services, the physician simply marks the designated space beside the requested service(s). If the requested services require special instructions or information relevant to a particular patient, the instructions or information is submitted on a separate "Refer" form prepared by the physician. The "Refer" forms are two part forms the original of which becomes the report form, and the carbon remains in the testing facility for record of the test or procedure performed. Refer forms for services which do not require special guidance from the requesting physician are prepared by CAD attendants. Once the MSR is prepared, it is forwarded to the CAD for scheduling via a gravity chute conveyor system, while the patient is asked to be seated in the section lobby. The normal wait time for scheduling during peak load hours is approximately forty-five minutes.

When the MSR arrives at CAD, attendants at the CAD Forms Desk prepare any required refer forms not accomplished by the physician

and obtain Refer envelopes for the requested services. Refer envelopes contain patient preparation instructions relevant to the service requested, and directions for locating the service. Report forms for the specific service requested are inserted in the refer envelopes.

CAD terminal operators enter requested services in the automated system by means of numeric codes which have been assigned to each specific service. The numeric codes are printed on the MSR next to the appropriate service. Once all requested services have been entered, the computer formats the appointments and prints an itinerary schedule of the patient's appointment times, dates, services, and locations. Another schedule is also produced which lists the estimated time reports for each requested service should be available to assist clerical personnel in scheduling a consultation with the examining physician.

Once the appointment schedules have been prepared, the MSR is annotated to indicate all requested services have been scheduled, and the completed package is sent back to the section desk. The Section Desk receptionist explains the schedule to the patient and gives the patient the refer envelopes. The MSR is kept at the desk and is annotated when completed reports are returned to the desk.

Clinic Access

Patient access to Mayo Clinic is designed to be consistent with the following intention set forth by the Board of Governors:

"To offer, to both the sick and well, comprehensive medical care of the highest standard." Patients may seek entry into the system at the primary, secondary, or tertiary level of care according to medical necessity. The full services of the Clinic are available to all patients whether they are referred by a personal physician or seek care on their own.

All clinical specialties and sub-specialties except Community Medicine, are located in the Mayo Building. Community Medicine clinics are located in the Baldwin Building for Community Medicine. Descriptive data related to the clinical specialties observed for this study are presented in Table 9.

Mayo Clinic is open from 6:30 A.M. to 6:00 P.M., on Monday and from 6:45 A.M. to 6:00 P.M., Tuesday through Friday. The clinic is closed on Saturday and Sunday. Most direct patient services are conducted from 8:00 A.M. to 5:00 P.M. After hours and weekend care is provided for acute medical problems by an "on call" medical staff member.

The general patient flow sequence for outpatient visits to clinics located in the Mayo Building is presented in Figure 9. On the scheduled appointment date, all patients except those scheduled for Community Medicine services, report to the Admission Desk in the main lobby of the Mayo Building. Pre-registered patients receive a registration folder bearing their name, registration number, physician's name, and the location of the appropriate Section Desk. Patients that have not been pre-registered are asked to complete a brief registration form

TABLE 9

CLINIC OPERATIONS: MAYO CLINIC

Clinics	Staff Physicians	Support Staffing Ratio (Medical Only)	Exam Room Ratio	Clinic Hours	Average Visits Per Month	Physician Productivity Ratios (Visits / Available Days)
Pediatrics	16.0	.62	2.5	*	3,136	10.17
Orthopedics	25.0	.92	2.5	*	5,864	22.23
General Internal Medicine	15.0	.80	2.5	*	3,158	10.03
General Surgery	18.0	NA	2.5	*	1,022	6.94
Obstetrics & Gynecology	4.0 **	1.75	2.5	*	3,876	15.18
Primary Care	6.0	.83	2.5	*	2,572	23.60

* 8:00 A.M. to 5:00 P.M., Monday through Friday.

** Community Medicine Building only.

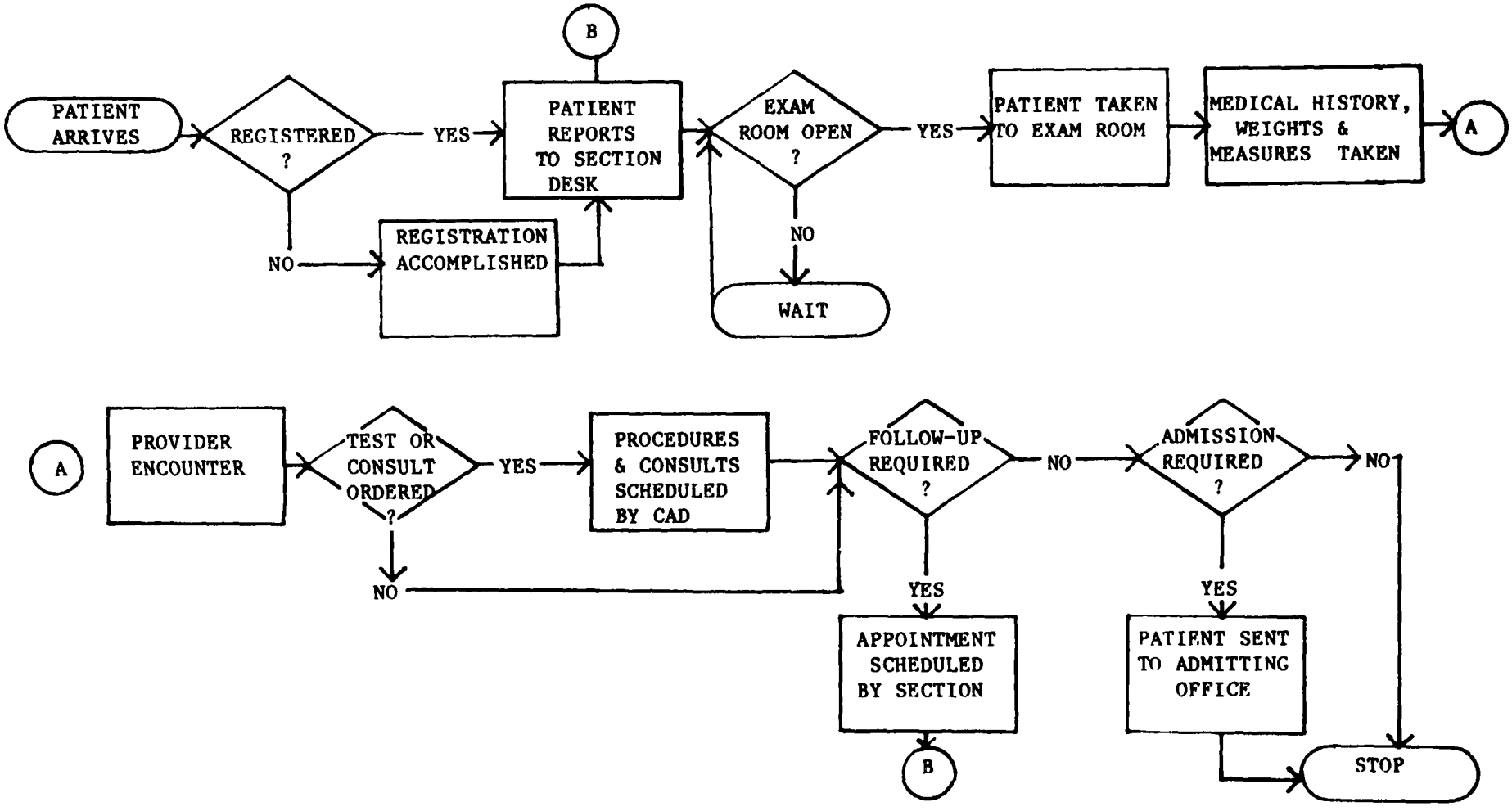


Figure 9. Clinic Flow Sequence: Mayo Clinic.

before they receive a registration number and folder. After patients receive their registration folders, the Admission Desk receptionists direct them to the proper Section Desk. Receptionist at the Section Desk will check the patient in and notify the desk attendants of the patients arrival. Availability of the medical record is verified and if an exam room is open, the desk attendant escorts the patient to the room. If an exam room is not available, the patient is asked to be seated in the waiting area. When an exam room becomes available the desk attendant will escort the patient to the room.

The patient flow sequence for outpatient appointments in the Community Medicine Building is basically the same as the patient flow presented in Figure 9. Patients with appointments in Community Medicine clinics report directly to the Section Desk of the specific clinic in which they are scheduled. Upon arrival at the Section Desk the patient is checked in by a receptionist. If the patient has not previously registered, the registration process is accomplished at the Section Desk. The receptionist then informs the desk attendants of the patient's arrival and the attendant verifies the availability of the patient's medical record. If an exam room is available, the attendant escorts the patient to the room. If an exam room is not available, the patient is asked to be seated in the waiting area until a room is open.

Once a patient has been seen by a physician, any required consultations and/or diagnostic test are requested on an MSR form

and processed by CAD in the manner described previously. When the patient has completed all necessary consults and/or diagnostic test, the physician will discuss the results of the studies with the patient and recommend the necessary course of care. If the physician determines that a patient's care requires admission to the hospital, the admission may be arranged at either of the two hospitals affiliated with the Clinic. If a patient has been referred to Mayo Clinic by his "home" physician and prefers to return home for any inpatient care, a report of the Clinic physician's findings will be forwarded for use by the home physician.

Patient medical records, or histories, are created, stored, and distributed from a centralized Medical Records Section. Both inpatient and outpatient records of patients treated by Clinic physicians are the property of Mayo Clinic. Records are distributed throughout the facility by a series of conveyors, vertical lifts, and pneumatic tubes. An automated index file utilizing Bar Codes is used to indicate the location to which records have been distributed. Once a patient record has been signed out to a particular section, that section becomes responsible for the record's accountability until the treatment episode is completed. The location of records that are transferred to other sections for consultations and diagnostic tests must be tracked by the home section. The record is returned to the Medical Record Section when the treatment episode is completed.

The staffing of clinical specialties and sub-specialties is organizationally structured by the departmental concept discussed previously. Department chairmen are responsible for conducting the activities of their departments in a manner consistent with the guidance and direction of the Clinical Practice Committee, the Education Committee, and the Research Committee.

Staff physicians at Mayo Clinic are called consultants. Consultants are assisted in clinical practice by a well distributed support team of residents, medical students, and paramedical personnel. Medical residents, and students participate in the delivery of patient care under the direct supervision of the consultants. Nurse associates with significant advanced training are utilized in some specialties to provide patient care, under close supervision of consultants, for common medical problems. Other members of the health care team include nurses, nurses aides, technicians, medical secretaries, desk attendants, and desk receptionists.

Admissions and Dispositions

The fact that Mayo Clinic does not own nor operate an inpatient treatment facility, but is closely affiliated with two outstanding hospitals in Rochester, has already been addressed. When patients being seen in the Clinic require inpatient care, and elect to receive that care at either of these hospitals, the Clinic physician initiates an admission authorization form and the patients are directed to the Hospital Pre-Admission Office. The

need for Section Desk personnel to coordinate patient admissions prior to sending patients to the Pre-Admission Office has been eliminated in a rather unique way. A series of green, amber, and red lights are used to indicate bed availability for each hospital. A set of lights for each hospital are installed in the ceiling of each Section Desk, at strategic locations. A green light indicates that eleven or more beds are available. An amber light indicates that less than ten beds are available, and a red light indicates full bed capacity for routine admissions.

All patients except urgent or emergency admissions, must process through the Pre-Admission Office. Pre-Admission Offices are located in both the Mayo Building and the Community Medicine Building, and are staffed by admission personnel from Rochester Methodist Hospital and Saint Marys Hospital. The office is open from 8:00 A.M. to 6:30 P.M., Monday through Friday. Patients requiring admission after hours and on weekend report directly to the Admissions Office at either hospital.

During calendar year 1982, Saint Marys Hospital admitted approximately 32,300 patients. These admissions resulted in an average daily patient load of 868, and an average length of say of 9.8 days per patient. The bed capacity of the hospital during this period averaged 1,057 beds.

Rochester Methodist Hospital had approximately 29,600 patient admissions for calendar year 1982, which resulted in an average daily patient load of 647, and an average length of stay of 8.0 days. Bed capacity for the hospital during the year averaged 759 beds.

The general patient admission flow sequence for both inpatient facilities are very similar. A schematic of the patient admission flow for both Saint Marys Hospital and Rochester Methodist Hospital is presented in Figure 10. The patient admission flow sequence for both facilities are presented together because of their similarity. Patient admission data collected for this study will be addressed under the Comparison of Admission Systems.

Patient accountability is provided by means of an automated system at each hospital. Both systems track bed status and availability, pre-admissions, admissions, transfers, and dispositions.

At the Pre-Admission Office, admissions personnel from the two hospitals enter patient registration information, physician admitting instructions, room preference, and insurance or billing arrangements in the computer. Once the data are entered in the system, it is automatically transmitted to the Admissions Office at the corresponding hospital. This process enables the Admission Office receptionist at both facilities to prepare necessary items such as imprint cards and patient identification bracelets while the patient is en route to the hospital. Once patients have completed the necessary pre-admission processing, they are sent to the Admissions Office at the designated hospital.

Upon arrival a the designated hospital admissions office, the patient is given a bed assignment and identification bracelet. The patient is then escorted to the proper inpatient unit.

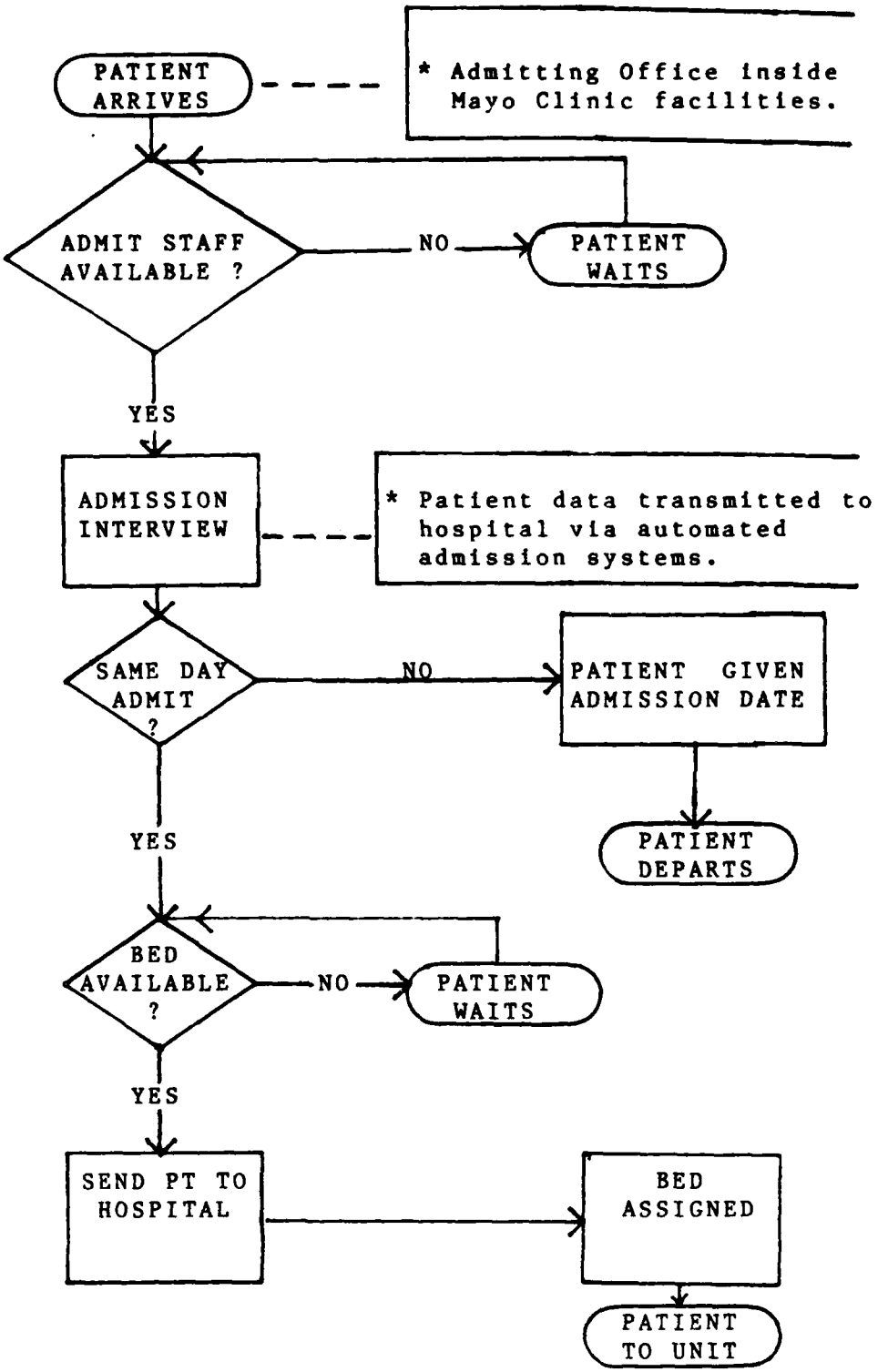


Figure 10. Admission Flow Sequence: Rochester Methodist Hospital and Saint Marys Hospital.

The patient discharge process at Rochester Methodist Hospital is a one stop process. Discharge time is 11:00 A.M., unless other arrangements are made. Pending discharges, when identified, are entered in the computer on the evening prior to the discharge date. When the discharge order has been written and the patient is ready to leave the nursing unit, the patient is escorted to the Business Office where arrangements are made to settle the account. Upon clearing the Business Office, the patient is free to leave. Once the patient leaves the nursing unit and housekeeping personnel have prepared the bed to receive another patient, an update entry is made to the system and the bed is shown available.

The patient discharge sequence at Saint Marys Hospital is a one stop process for patients that need to make financial arrangements with the Business Office. Saint Marys Hospital does not have a set discharge hour. Once the physician's discharge order is written, the discharge data are input to the computer by nursing unit personnel, and the patient is free to leave. If financial arrangements made at the time of admission satisfactorily cover all charges, patients are discharged directly from the ward without having to stop at the Business Office. Once the bed is ready for reassignment, an update entry is made in the computer which lists the bed as available.

Cleveland Clinic Foundation

General

The Cleveland Clinic Foundation (CCF) is a private, multi-specialty group practice located in Cleveland, Ohio. The Foundation provides a unified health care delivery system through comprehensive programs in clinical practice, medical research, and medical education. The Foundation operates an inpatient facility, the Cleveland Clinic Foundation Hospital, which currently contains 1,008 beds. In addition to serving the health needs of the local region, the Foundation treats patients from throughout the United States and around the world.

In calendar year 1982, the health care delivery team at CCF provided over 410,000 visits on an outpatient basis, and delivered inpatient service to the more than 32,000 patients admitted to the hospital. The Foundation has a total staff of approximately 7,500 personnel including 375 staff physicians and surgeons, and 484 Clinical Associate Physicians (Fellows) and Clinical Fellows (Residents). More than 3,800 of the total personnel work in the hospital.

The medical staff of the Foundation provides patient care in thirty-eight clinical specialties, and related sub-specialties, while actively participating in comprehensive medical education and research programs. Each of the clinical specialties are organized as departments which are in turn structured under one of the following divisions: the Division of Surgery, the Division of Medicine, the Division of Radiology, the Division of Laboratory

Medicine, or the Division of Anesthesiology. Each division is responsible for conducting relevant activities in consonance with the policy and guidance established by the Foundation's Board of Governors and plans and programs developed by the Management Group.

Appointment System

The Appointment System at Cleveland Clinic is decentralized to the clinical specialty and sub-specialty level. In certain specialties the system is even decentralized to the individual provider. The operational feasibility of such a decentralized appointment system is made possible through an automated appointment scheduling system. Patients or referring physicians wishing to schedule appointments may contact the appropriate service directly either by phone or mail. However, a Central Appointment Services (CAS) function has been established to assist and direct patients that may not know which service can best address their medical needs, and a Routing Department provides coordinated scheduling service for special diagnostic test and consults to other specialties. Policy and guidance concerning appointment scheduling is the responsibility of each department chairman.

Staffing of the appointment function varies for each service based on the volume of patient visits, the number of providers supported, and the level of decentralization. Different personnel classifications of the individuals responsible for scheduling

appointments also have an impact on staffing. In some departments scheduling is accomplished by full time appointment receptionists, while scheduling of appointments in other departments is a part time responsibility of desk receptionists or medical secretaries. Descriptive data for each clinical appointment scheduling function observed for the purpose of this research effort is presented in tabular format in Table 10.

The CAS function directs and assist patients and referring physicians in determining the appropriate clinical specialty or sub-specialty as mentioned earlier. In addition to this triage service, CAS provides scheduling coordination between patients and the Routing Office; a pool of "Floaters" which provide back-up staffing support to appointment functions in all departments during vacations, sick days, or other staffing shortages; and training for all appointment receptionist, new staff, and Administrative Supervisors.

The general patient appointment scheduling flow sequence for CCF is presented in Figure 11. The first step in the appointment scheduling process involves screening or triage of the patient's medical problem. All personnel involved in appointment scheduling are trained in basic triage. If a patient's request cannot be addressed by the receptionist, assistance in determining the proper source of care is sought from supervisors, nurses, and physicians. If the patient's needs are best served by another department, the patient is transferred to the appropriate department.

TABLE 10

CLEVELAND CLINIC
APPOINTMENT SYSTEM

Clinics	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Schedules Submitted	Appt. Log Intervals
Pediatrics	*	3.0	3	3	1.16	yes	3 Months
Primary Care	*	3.0	3	3	1.18	yes	3 Months
Gynecology Gynecology	*	2.5	6	6	1.42	yes	3 Months
General Internal Medicine	*	3.0	3	3	1.18	yes	3 Months
General Surgery	*	1.0	2	1	1.35	yes	3 Months
Orthopedics	*	5.0	4	4	1.29	yes	3 Months

* 8:00 A.M. to 5:00 P.M., Monday through Friday.

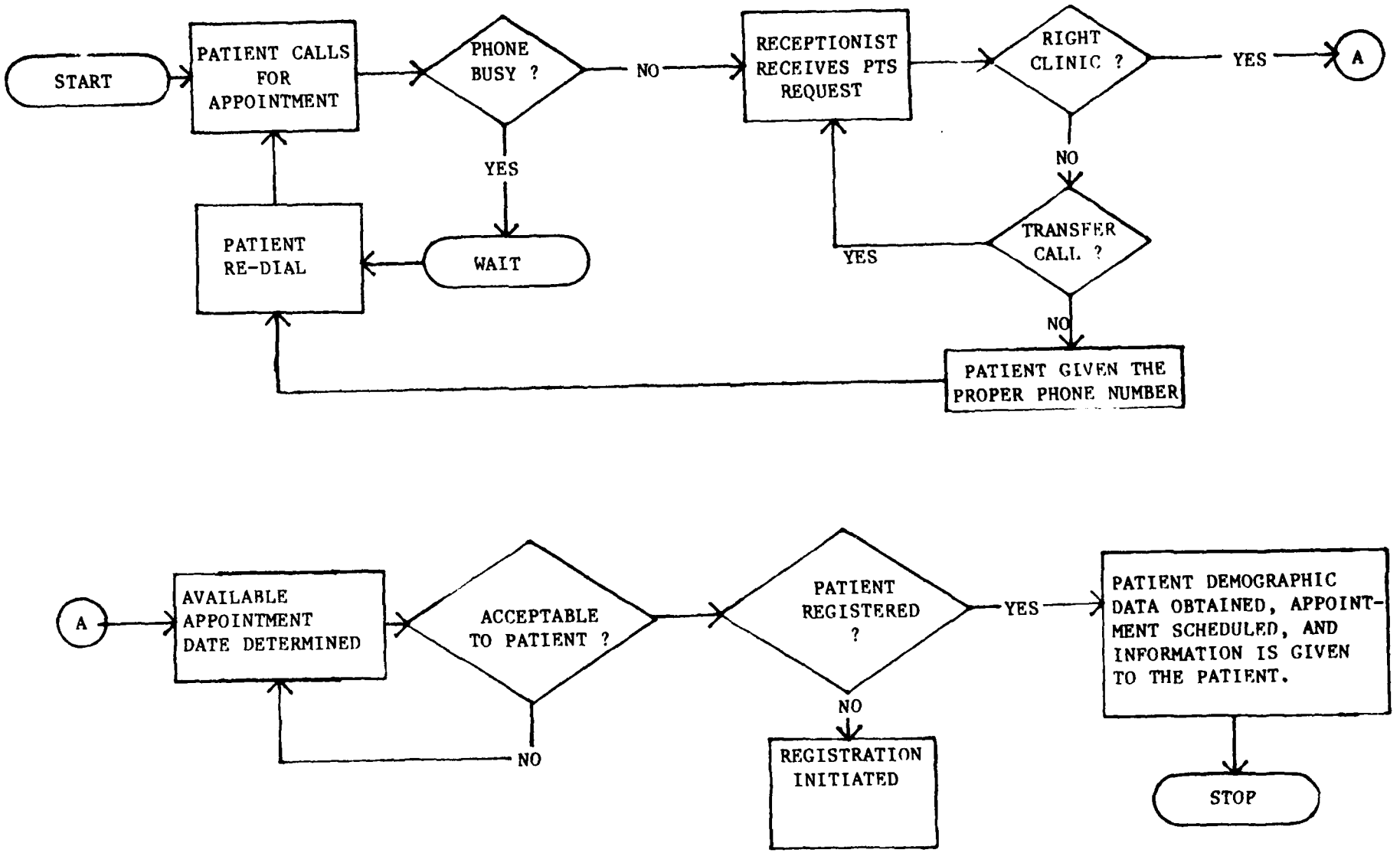


Figure 11. Appointment Flow Sequence: Cleveland Clinic

Once the proper service has been identified, the receptionist obtains patient demographic data and determines whether or not the patient is registered. Patient registration is initiated if necessary, and a pseudo registration number is assigned for scheduling purposes. Appointment availability is then determined via the automated system, and the patient is scheduled by date, time, physician, and clinic desk. Once appointment scheduling is complete, the receptionist instructs the patient regarding clinic location and if necessary, where to report for registration. If adequate lead time is available prior to the appointment date, registration forms and medical history forms are mailed to newpatients. These documents are either returned to the clinic by mail, or carried by the patient on the appointment date.

Normal appointment scheduling is conducted in all clinics from 8:00 A.M. to 5:00P.M., Monday through Friday. Appointment schedules are generally set up on monthly intervals and are projected out three months.

On the day prior to a particular clinic session, a hard copy document identified as the "Day Sheet" is produced from the automated scheduling system and distributed to the designated clinic Reception Desk, and the Medical Chart Room. The document displays each provider's appointments for the following day by patient name, time, type appointment, and department. A remarks column also appears on the day sheet which includes brief notes relating to the patient's medical problem or other information.

Provider availability schedules are entered in the automated scheduling system according to master schedules established by each specific department or individual physician. All routine activities which each provider must participate in are portrayed on this schedule. The schedules are displayed in a calendar format that shows appointment availability times by date, time, and type of appointment. In some clinics, appointment times are formated in flexible intervals of fifteen minutes each. This flexibility accommodates the scheduling of different length appointments as needed. In other clinics, appointment times are formated according to the schedule established by the provider. At the beginning of the month, each provider identifies any deviations to the master schedule such as special meetings or travel, and the system is updated accordingly.

The telecommunications capability at CCF is provide through a Bell Centrex System. Phone instruments in each appointment scheduling area consist of single line instruments with call hold, and call forwarding or transfer features. These instruments do not have rotary switch, call sequencing, and recorded message capabilities at the present time. Because of the decentralized structure of CCF's appointment system, the lack of these features does not present a problem except during extremely busy periods.

The Routing Department at CCF provides coordinated scheduling for special diagnostic test, consultations between services, and some admitting interviews. Some routine diagnostic test and individual consultant referrals are scheduled by the requesting

department. Quotas for diagnostic and consultant services requested through the Routing Department have been determined by means of averaging the quantities of services scheduled by Routing over a given period of time. Once established, these quotas are "blocked" for use by Routing. When a provider determines that certain special diagnostic test and/or consultations are necessary for a patient's care, a CCF Physician's Order form is prepared. The Physician's Orders form is a pre-printed form which lists the special procedures and consults most requested by the medical staff. Once the form is prepared, the physician explains the requested services to the patient, and at the completion of the visit, the patient is directed to the Routing Department for scheduling. During peak rush hours, scheduling by the Routing Department takes between thirty and forty-five minutes. Routing Department personnel manually sequence all requested services and schedule the appointments via the automated scheduling system. When the requested services have been scheduled, the patient is given a list of scheduled appointments and informed of the location and times for each appointment. Patients are usually scheduled to return to the requesting physicians office after all scheduled tests and consults are completed.

Clinic Access

The Cleveland Clinic Foundation is a renowned tertiary medical center, yet patients may seek and obtain medical care at the

primary, secondary, or tertiary level as required. Both self-referral's and physician referral's are received by the staff. Descriptive information relevant to each of the clinical specialties observed in this study is presented in Table 11.

Normal hours of operation for CCF ambulatory clinics are Monday through Friday, from 8:00 A.M. to 5:00 P.M. The Clinic is closed on Saturday, Sunday and holidays. Patients seeking urgent care are directed to contact the Emergency Department when the Clinic is closed.

The general patient flow sequence for outpatient visits to CCF clinical specialties is presented in Figure 12. On the date of the scheduled appointment, patients not previously registered arerequested to arrive about thirty minutes prior to their appointment time so that proper patient registration may be completed. Because of the size of the CCF complex, three Patient Registration Desks are strategically located for patient convenience. Patients that are currently registered are instructed to report directly to the appropriate clinic reception desk. Upon arrival at the designated appointment location, patients are checked in by a desk receptionist who in turn verifies availability of the medical chart. If an exam room is available, the patient is escorted to the room. If an exam room is not available, the patient is asked to be seated in the waiting area. Once in the exam room, the patient's medical history and current condition are taken by the physician or an assistant, and the physicians examination is conducted. If special diagnostic

TABLE 11

CLINIC OPERATIONS: CLEVELAND CLINIC

Clinics	Staff Physicians	Support Staffing Ratio (Medical Only)	Exam Room Ratio	Clinic Hours	Average Visits Per Month	Physician Productivity Ratios (Visits / Available Days)
Pediatrics	10.0	.70	2.0	*	1,459	NA
Orthopedics	13.0	.92	2.5	*	3,002	NA
General Internal Medicine	10.0	.80	2.0	*	1,508	NA
General Surgery	6.0	.83	2.0	*	602	NA
Obstetrics & Gynecology	7.0 **	1.57	2.0	*	1,574	NA
Primary Care	7.0	1.20	2.0	*	2,994	NA

* 8:00 A.M. to 5:00 P.M., Monday through Friday.

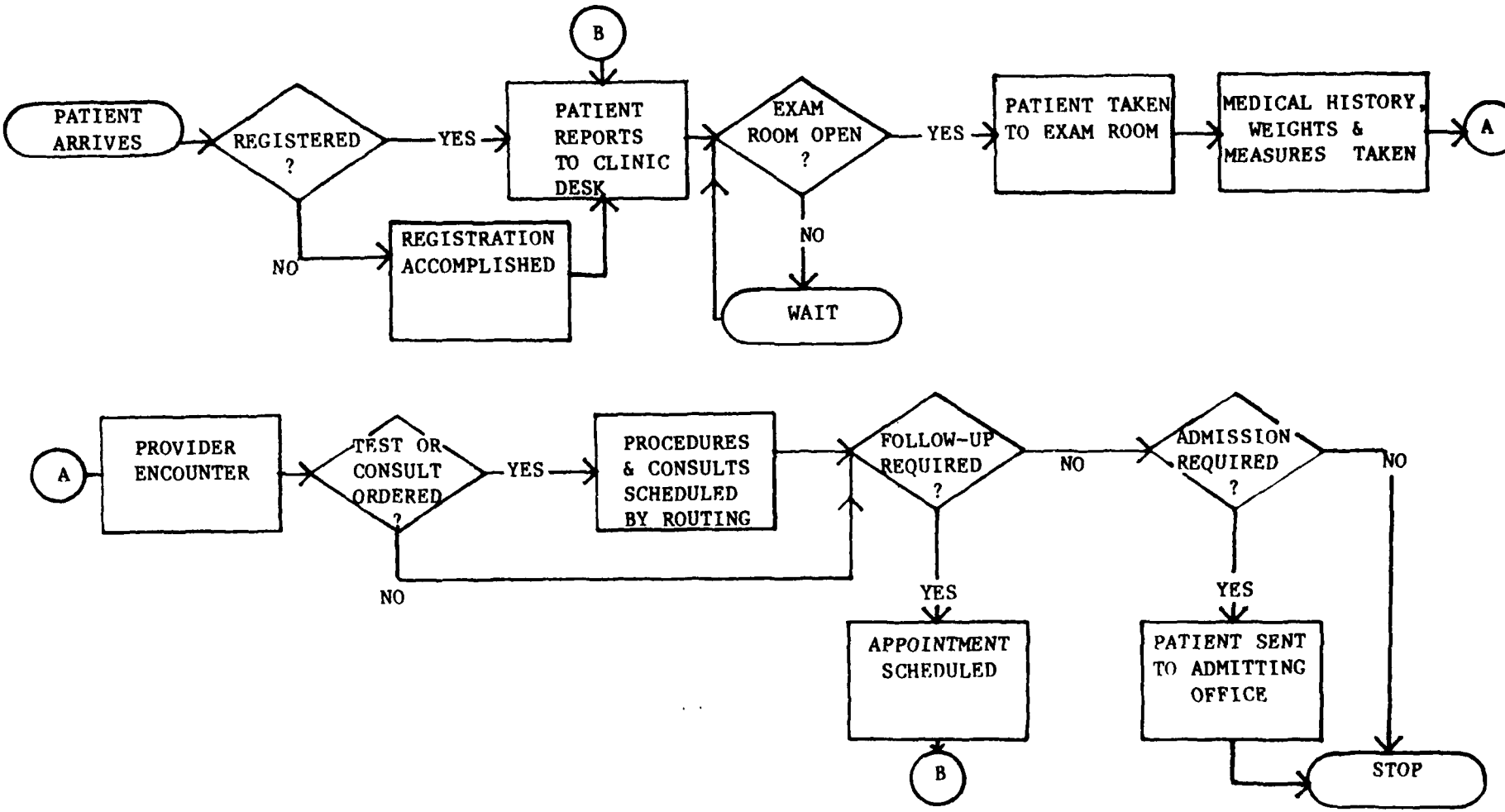


Figure 12. Clinic Flow Sequence: Cleveland Clinic

test and/or consultations from other services are required, the physician prepares a Physician's Order form and the patient is directed to return to the reception desk. When the requested services are to be scheduled by the Routing Department, the patient is given directions to the department. If the services do not need to be scheduled by Routing, the patient is directed to the appropriate service by the desk receptionist. In most cases, the patient is scheduled to return to physicians office for review of the examination results and recommended course of care. If the patient has been referred to CCF by a personal physician, a report of the findings will be forwarded to the referring physician upon request. When a Clinic physician determines that a patient requires hospitalization, clinic personnel arrange an admission date with the Admitting Office. If pre-admit studies are requested by the physician, the patient is directed to the Routing Department for completion of a schedule which includes an admitting interview. The admitting interview may be scheduled for the same day or later.

Medical records are stored and controlled from a central location called Medical Records Handling. Records are distributed to clinical areas either manually or by means of a mechanical lift, depending on the destination. New patients visiting the Clinic for the first time receive their medical chart at the Registration Desk and carry it to the designated appointment location. The charts of previously registered patients are signed out and distributed to the appropriate clinical area prior to the scheduled appointment time.

The staffing of clinical areas at CCF is structured by the departmental concept addressed earlier. All clinical specialties and sub-specialties are lead by CCF Staff Physicians and Associate Staff Physicians. These providers practice only at the Cleveland Clinic Foundation. Clinical Associate Physicians (Fellows) and Clinic Fellows (Residents) assist in providing patient care under the supervision of staff and associate staff physicians. Medical support staffing for the departments include Registered Nurses, Licensed Practical Nurses, and Patient Care Assistants. Administrative support personnel for each department are managed by an Administrative Supervisor or Clerical Supervisor, and include Medical Desk Receptionists, Appointment Secretaries, and Medical Secretaries.

Admissions and Dispositions

The Admitting Office at Cleveland Clinic Foundation Hospital (CCH) is responsible for the coordination of all admission and disposition functions at CCH. The Admitting Office is also responsible for the operation of Hospital Information and Visitor Pass functions. Admitting is centrally located adjacent to the South Hospital Lobby, and is staffed twenty-four hours a day. The Admitting Office is organized under the Director of Admitting.

Staffing for the Admitting Office consists of thirty-eight full time employees. Twenty additional employees staff the Hospital Information and Visitor Pass functions. Total staffing for the office is displayed in Table 12.

TABLE 12

CLEVELAND CLINIC HOSPITAL
ADMISSIONS OFFICE STAFF

Direcor of Admitting	1
Assistant Director	1
Area Supervisors	2
Work Leaders	2
Financial Coordinator	1
Admitting Office Coordinators	11
Licensed Practical Nurse	1
Advance Registration Coordinators	2
Admitting Receptionist	4
Admitting Interviewers	12
Totals	38

The Admitting Office at CCH processed over 32,000 patient admissions during calendar year 1982. The average daily patient load during this period equated to 825 patient per day, and the average length of stay was 9.41 days. Average bed capacity during 1982 was 1,008 beds.

Accountability and tracking of patient admissions and dispositions is accomplished through an automated admissions system. The system provides a wide variety of traditional admission and disposition documents, and locally developed management information reports. Examples of the management information reports are: (1) a "Projected Discharge Schedule"based on predictor models established for each specialty and provider, and (2) a "Projected Physician Out Log" that indicates the time physicians will be away from CCF and not admitting patients.

The general patient flow sequence for patients being admitted to CCFH is presented in Figure 13. Patient admission data collected for this study will be presented under the Comparison of Admission Systems.

When a physician determines that a patient should be admitted to the hospital, the Admitting Office is contacted by the medical secretaries, and an admission date is established. If the patient is to be admitted on the day of the clinic visit, arrangements are coordinated and the patient is sent to the Admitting Office. Patients that are to be admitted on a later date may be scheduled for an admitting interview the day of their clinic visit, or later when they return for admission. When patients are scheduled for

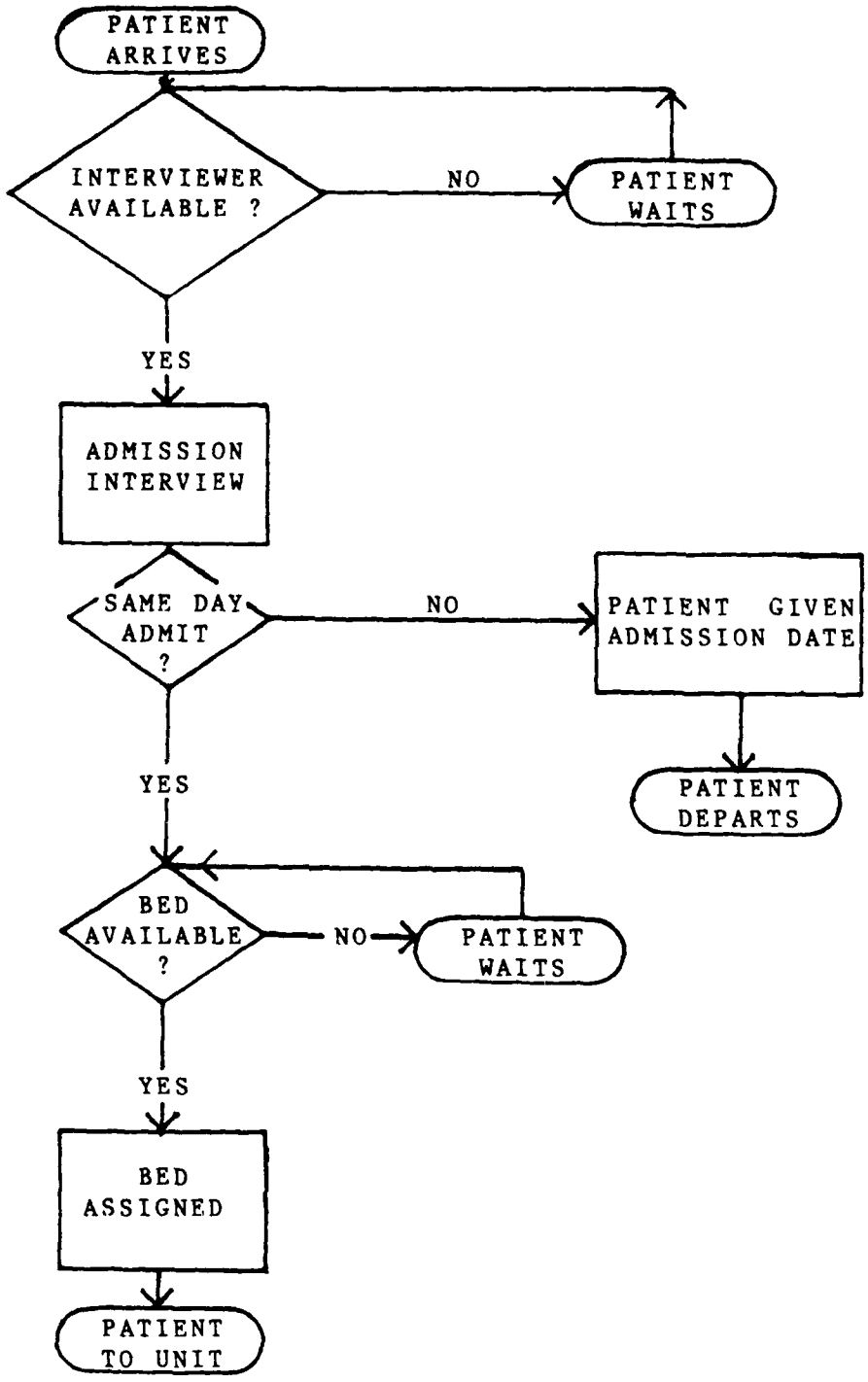


Figure 13. Admission Flow Sequence:
Cleveland Foundation Hospital

admission on later dates, the clinics are encouraged to send these individuals to the Admitting Desk. The Admitting Desk collects patient demographic and financial information, and physician's name. Once the data are entered in the system, a Pre-Admit admissions packet is generated. The admitting interview process takes approximately twenty minutes. About 25 percent of all admissions are processed in this manner.

On the day of admission, patients are instructed to report to the Admitting Desk in the hospital lobby. If the admitting interview has not been accomplished previously, it is completed at this time. Once the admitting interview is completed, the Admitting Desk Receptionists request bed assignment for the patient, issues a patient identification bracelet, and stores patient valuables if requested. Bed assignment is controlled manually by the Admitting Office Coordinator. Bed availability and status is maintained on a bed status board. Once bed assignment has been made, the patient is escorted to designated inpatient unit by a transportation host.

The patient discharge sequence at CCH is a one stop process. Physicians are encouraged to inform the patient and the nursing staff of pending discharges at least one day in advance. Discharge time is 11:00 A.M., and physicians are encouraged to write discharge orders early enough to allow the discharge to be accomplished by this time. On the morning of the discharge, nursing unit personnel notify the Admitting Office Coordinator of the pending discharge by phone.

Patients being discharged at CCH must stop at the Business Office prior to leaving the facility. After the physician discharge order is written, a discharge slip is prepared at the nursing unit and the patient is escorted to the Business Office.

Once a patient has left the nursing unit, housekeeping personnel are contacted to prepare the room. When the room is cleaned, the Admitting Office Coordinator is informed that the bed is available for assignment.

Comparison of Appointment Systems

Results

In evaluating the appointment systems at the four facilities visited, the ability of each system to accommodate patients in a timely manner was the foundation for the observations. This approach was derived from the "Accommodation" and "Availability" dimensions of patient access discussed by Penchansky and Thomas.[1]

Random sampling of patients calling the selected clinical specialties was conducted to determine an estimate of the mean number of attempts a patient must make to access the appointment system. Sample data were obtained for all selected clinical specialties except for cases where either institutional, or individual clinic policy and procedure prohibited valid sampling.

One-way analysis of variance was performed on the sample data using the BMDP Program P7D.[2] In addition to computing the values of the ANOVA Table, this program also performed multiple comparisons of all pairs of means using a simultaneous significant

"p-value" derived from Bonferroni's inequalities.[3] Results of the one-way analysis of variance, and the multiple comparison of the pairs of means are presented in Table 13.

Preliminary results of the analysis of variance indicated significant difference exists between WHMC's and the other facilities group means for both the overall, and the individual clinical specialties (treatments) at the 1 percent level of significance. Thus, the null hypothesis of no difference between the means was rejected at the 5 percent level of significance. Further examination was conducted based on the pair-wise comparisons (T-test) of permutations of the group means. With the exception of the Obstetrics and Gynecology (OB/GYN) appointment desk, results of these comparisons indicated that the mean number of attempts to access the selected appointment desks at WHMC appear significantly greater than the mean attempts to access similar appointment desks of at least two of the other facilities observed ($p \leq 0.001$). Pair-wise comparisons of the group means for the four OB/GYN appointment desks indicated the mean attempts to access this desk at WHMC appear to be significantly less than the mean attempts made to access the similar appointment desk at Cleveland Clinic. Significant difference between the mean attempts to access the OB/GYN appointment desks at WHMC and the other groups was contradicted by the pair-wise comparisons.

The analysis of the sampled data indicated that overall, patients appear to make a greater number of attempts to access the

TABLE 13

ANOVA TABLE AND MULTIPLE COMPARISON RESULTS
ATTEMPTS TO ACCESS THE APPOINTMENT SYSTEM

Groups		All Cases	Wilford Hall	Cleveland (A)	Mayo (B)	Ochsner (C)	F Statistic	p-value
Overall	X	1.6138	1.8080 *	1.3460	1.3151	1.2712	40.7012	< 0.0001
	n	6,455	3,906	1,266	457	826		
Pediatrics	X	2.0704	2.7986 *	1.1691	1.5113	1.2406	24.7466	< 0.0001
	n	824	422	136	133	133		
Orthopedics	X	2.6777	4.3020 **	1.2926	NA	1.4273	78.6961	< 0.0001
	n	543	245	188	NA	110		
Internal Med.	X	1.4237	1.5027 **	1.1871	1.3725	1.1940	3.8179	0.0097
	n	1,310	919	155	102	134		
General Surg.	X	1.7535	2.7871 **	1.3578	NA	1.2014	23.3752	< 0.0001
	n	503	155	204	NA	144		
OB/GYN	X	1.2793	1.2440 ***	1.4203	1.1552	1.4057	6.8706	0.0001
	n	1,543	1,045	207	116	175		
Primary Care	X	1.4642	1.5304 ****	1.4548	1.1887	1.1462	6.7965	0.0001
	n	1,732	1,120	376	106	130		

Individual T-test Comparisons:

* WHMC was > A, B, & C, ($p < 0.001$)

** WHMC was > A & C, ($p < 0.001$)

*** WHMC was < A, ($p < 0.05$)

**** WHMC was > B & C, ($p < 0.001$)

observed appointment desks at WHMC than do patients at the other three institutions. With the exception of the OB/GYN appointment desks, the sampled data also indicated that WHMC patients appear to make a greater number of attempts to access each of the appointment desks for the selected clinical specialties, when analyzed separately.

Factors of Influence

In comparing the appointment systems at each of the four facilities, the objective was to identify elements of each system's procedures which may be contributing to, or detracting from, responsive patient access to the systems. The analysis of the mean number of attempts patients must make to access the appointment system was used as an indicator of each systems responsiveness. Overall facility appointment systems and individual clinical specialty appointment systems which appeared to be more responsive to patient access than WHMC were compared to identify dissimilar elements which may contribute to the differences. The descriptive information and the patient flow sequence models presented previously, were used to make the comparisons.

From the observations made for this study, there appear to be five elements which have influence on patient access to the appointment systems. These elements include: (1) appointment system staffing, (2) type and quantity of communications devices, (3) hours which appointment desks may be accessed, (4) available

time interval of appointment logs, and (5) automation of appointment scheduling and communication system components. When these elements are matched with the sample mean of patient attempts to access each individual appointment desks, the positive or negative influence of the elements can be identified.

In comparing each of the observed appointment systems in the manner described above, it appears as though the mean attempts to access an appointment desk begins to increase when two or more of the elements are deficient. For example, Table 14, shows the mean number of patient attempts to access the Obstetrics and Gynecology appointment desk at WHMC compared favorably with the number of attempts required to access similar desk at the other three institutions. This desk: (1) is staffed with four receptionist; (2) is equipped with four multi-station phone instruments; (3) is open eight hours a day, five days a week; and (4) maintains appointment logs for intervals of three to six weeks out. Of the five elements listed above, automation of components is the only element lacking at WHMC.

To show the negative influence of these elements, the comparison of the Orthopedic appointment desk at WHMC with similar desks at the other facilities is presented in Table 15. Patient access to this desk requires the greatest number of attempts among all desks that were sampled. When compared to similar desks at the other three facilities, this appointment desk is deficient in all five elements. The Orthopedic desk at WHMC: (1) is staffed

TABLE 14

ELEMENTS OF INFLUENCE
OBSTETRICS AND GYNECOLOGY
APPOINTMENT SYSTEMS

Facility	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Automated System ?	Appt. Log Intervals
Wilford Hall	7:30 - 4:15	4.0	4	6	1.24	NO	4-6 Weeks
Ochsner Clinic	8:00 - 5:00	2.0	2	4	1.40	NO	3 Months
Mayo Clinic	8:00 - 5:00	3.0	3	4	1.15	Yes	3 Months
Cleveland Clinic	8:00 - 5:00	2.5	6	6	1.42	Yes	3 Months

TABLE 15

ELEMENTS OF INFLUENCE
ORTHOPEDIC CLINIC APPOINTMENT SYSTEMS

Clinics	Hours Open	Appointment Staffing	Phones	Phone Lines	Mean Attempts	Automated Systems	Appt. Log Intervals
Wilford Hall	7:30 - 4:15 *	1.0	1	3	4.30	No	1 Week
Ochsner Clinic	8:00 - 5:00	Central	-	-	1.42	**	3 Months
Mayo Clinic	8:00 - 5:00	3.0	3	3	NA	Yes	3 Months
Cleveland Clinic	8:00 - 5:00	5.0	4	4	1.29	Yes	3 Months

* New Patients can only schedule appointments on Fridays.

** Has an Automated Call Distribution System to support Central Appointments Desk.

with only one receptionist, (2) is equipped with only one multi-station phone instrument, (3) is only accessible on Fridays for New Patient appointments, (4) maintains New Patient appointment logs for just one week intervals, and (5) does not have any automated components.

Another comparison, the next available appointment date for a routine appointment in each of the clinical specialties observed, is presented in Table 16. With the exception of the Orthopedic clinic, the appointment availability in each of clinical specialties at WHMC indicates a longer patient queue for access. Although a multitude of possible factors may influence this

TABLE 16

NEXT AVAILABLE APPOINTMENT DATE
ROUTINE APPOINTMENTS

Clinic	Wilford Hall	Ochsner	Mayo	Cleveland
Pediatrics	< 2	< 1	< 1	< 1
Orthopedics	< 14	< 10	< 14	< 14
General Internal Medicine	< 10	< 2	< 2	< 2
General Surgery	< 14	< 2	NA	< 3
Obsterics and Gynecology	< 14	< 7	< 3*	< 7**
Primary Care (Community Medicine)	< 2	< 1	< 1	< 1

* Obstetrics only

** Gynecology only

difference, an objective determination could not be made from available information. However, the data were found to be of value in the evaluation of appointment log intervals. When questioned as to why the intervals for appointment logs were so short in several of the observed clinics at WHMC, clinic personnel rationalized that longer intervals would result in larger volumes of traffic on the appointments systems, and extended lead times for the next available appointment. A quick comparison of the next available appointment dates, intervals of appointment logs, and number of attempts to access appointment desks for the other facilities dispels this contention.

The managerial question for WHMC raised by this analysis, centers on the import of the actual differences in patient attempts to access the appointment systems. Perhaps the answer can be provided indirectly in knowing that each of the other institutions included in this study are either studying or already implementing enhancements to one or more of the five elements discussed.

Comparison of Clinic Operations

Results

The evaluation of clinic operations for the selected clinical specialties at each of the observed facilities focused on patient accommodation and resource availability.[4] Both the observation and analysis of clinic operations were made with previous recognition of the unique practice patterns of individual providers.

The average waiting time between a patient's scheduled appointment time and the time of the patient's access to the provider's examination room was used as an indicator of each clinic's ability to accommodate patient access. Random sampling of patients visiting each clinic was conducted to determine an estimate of the mean wait time in each of the selected clinical specialties observed. Sample data were collected from each of the selected clinical specialties except in those cases where either institutional, or individual clinic policy and/or procedure prevented valid sampling.

One-way analysis of variance was performed on the sample data using BMDP Program P7D.[5] This program was also used to perform multiple comparisons on all pairs of means using a simultaneous significant "p-value" derived from Bonferroni's inequalities.[6] Results of the one-way analysis of variance, and the multiple comparison of the pairs of means are presented in Table 17.

The results of the analysis of variance performed on the sample data did not provide sufficient evidence to cause rejection of the null hypothesis of no difference between the means with regard to the four Primary Care clinics. Thus the null hypothesis of no difference between the means, for these four clinics, is not rejected at the 5 percent level of significance.

The results of the sample data analyzed for the overall mean wait time, and the mean wait time in the five remaining clinical specialties, did indicate that significant dif erence exists

TABLE 17

ANALYSIS OF VARIANCE RESULTS FOR
APPOINTMENT WAIT TIME IN CLINICS

Groups		All Cases	Wilford Hall		Cleveland (A)	Mayo (B)	Ochsner (C)	F Statistic	p-value
Overall	X	11.1888	14.8325	*	9.5296	6.4269	9.4077	78.4958	< 0.0001
	n	4,983	1,875		1,569	499	1,040		
Pediatrics	X	9.1640	11.4267	**	6.4930	6.2538	10.1581	9.2306	< 0.0001
	n	738	232		142	130	234		
Orthopedics	X	19.8640	30.4625	***	14.6224	NA	13.0532	43.8940	< 0.0001
	n	669	240		241	NA	188		
Internal Med.	X	9.3039	12.3643	*	8.5788	5.6870	6.6901	23.8016	< 0.0001
	n	1,007	387		292	115	213		
General Surg.	X	11.0302	13.0550	****	8.7412	NA	10.9055	5.0537	0.0067
	n	497	200		170	NA	127		
OB/GYN	X	12.9291	15.5533	*****	12.1287	7.4762	9.0775	19.7294	< 0.0001
	n	1,142	553		334	126	129		
Primary Care	X	6.5441	7.0418		6.3179	6.2344	6.5235	0.6417	0.5883
	n	930	263		390	128	149		

Individual T-test Comparisons: * WHMC was > A, B, & C, ($p < 0.001$) ** WHMC was > A & B, ($p < 0.001$)

*** WHMC was > A & C, ($p < 0.001$) **** WHMC was > A, ($p < 0.01$)

***** WHMC WAS > A, ($P < 0.01$), and WHMC was > B & C, ($p < 0.001$)

between the group means at the 1 percent level of significance. Based on these analyses, the null hypothesis of no difference between the means is rejected at the 5 percent level of significance.

Further investigation using the information obtained from the pair-wise comparisons of the group means within each category, indicated the sample means for WHMC appear to be significantly greater than those of similar means at the other facilities ($p \leq 0.01$), with two exceptions. The first exception of the pair-wise comparisons indicated that significant difference did not exist between the group means for the Pediatric clinics at Ochsner Clinic and WHMC. The second exception indicated that significant difference did not exist between the group means for the Orthopedic clinics at the same two facilities.

The analysis of the sampled data indicated that overall, patients seen in the selected clinics at WHMC appear to wait a greater length of time between their scheduled appointment time and actual access to a provider's examination room, than do patients at the other three institutions. With the exceptions of the Primary Care clinics and the two pair-wise comparisons mentioned above, the sampled data also indicated that WHMC patients appear to wait a greater length of time between their scheduled appointment time and actual access to a provider's

examination room, than do patients in similar clinics at the other institutions.

Factors of Influence

Based on the results of the statistical decisions, attempts were made to identify elements of each system's procedures which may be contributing to, or detracting from responsive patient access. Overall clinic operations, and clinic operations unique to each of the observed clinical specialties which appear to be more responsive to patient access than WHMC clinic operations, were compared to identify dissimilar elements which could be contributing to the differences. The descriptive information for each clinic and the patient sequence flow models presented earlier, were utilized to make the comparisons.

From the data collected and compared for this study, three elements have been identified that appear to influence patient waiting time in the clinical areas. These elements: (1) the quantity of support staff in the clinic, (2) the number of exam rooms for each provider, and (3) the overall provider productivity ratio (based on available days); are presented in Table 18. When these elements are compared with the corresponding mean wait time for each of the selected clinical specialties, the influence of the elements can be observed.

In comparing each of the clinical specialties in the manner described above, it appears as though an inverse relationship exists between the mean wait time value and the quantities or ratios of the three elements. In other words, as the quantities

or ratios of the three elements increase, the mean wait time appears to generally decrease. The mean wait time values for a particular clinic are consistently lower at the facilities which have higher values for each of the three elements. The major exception to this pattern was the comparison of the General Surgery clinics. This exception may exist due to missing data for the three elements. Two examples of the comparisons, using the General Internal Medicine and Obstetrics and Gynecology clinics of the observed facilities, are presented in Table 18. With the exception of the Primary Care clinic, each clinic observed at WHMC had a higher patient wait time and lower values for the three elements, than each of the similar clinics at the other facilities.

Two other factors which may influence patient wait time in the clinics warrant mention, based on the overall observations. The first of these factors relates to the concept of centralized scheduling for diagnostic procedures and consultations. This concept is employed at each of the civilian institutions visited as previously discussed. In clinical specialties which routinely request these services, the centralized scheduling concept can be utilized to coordinate these requests with the patient's scheduled appointment. For example, follow-up appointments in Orthopedic clinics quite often require that current Radiology procedures be accomplished immediately prior to the appointment. At WHMC, Orthopedic patients are instructed to report to the clinic as much as one hour prior to their scheduled appointment time in order to

TABLE 18

ELEMENTS OF INFLUENCE
CLINIC OPERATIONS

OBSTERTRICS AND GYNECOLOGY

Facility	Mean Wait Time (min)	Provider Productivity	Exam Rooms	Support Staff Ratio
Mayo Clinic	7.476	17.18	2.5	1.75
Ochsner Clinic	9.077	17.36	2.0	1.71
Cleveland Clinic	12.128	N/A	2.0	1.57
Wilford Hall	15.55	12.50	2.0	1.57

GENERAL INTERNAL MEDICINE

Facility	Mean Wait Time (min)	Provider Productivity	Exam Rooms	Support Staff Ratio
Mayo Clinic	5.687	10.03	2.5	0.80
Ochsner Clinic	6.690	6.70	2.0	1.00
Cleveland Clinic	8.578	N/A	2.0	0.80
Wilford Hall	12.364	6.55	1.0	0.42

accomplish these procedures. Since these procedures are "unscheduled", any queuing delays in Radiology will most likely influence the appointment schedule in the clinic.

The other factor which may influence patient wait time in clinics is indirectly related to provider availability. Several of the observed clinical specialties at WHMC either close completely one afternoon a week, or hold "special" clinics for specific medical problems on one or more afternoons each week. The time that these clinics are closed is used for research and educational requirements, while the "special" clinics are designed to concentrate the availability of both staff and resources on specific medical problems. The intent of this discussion is not aimed at agreement or disagreement with these procedures. However, both procedures result in a narrowing of the "access window" for the aggregate patient demand in those clinics. Similar practices were not observed to be as common at the other facilities, and in fact, the complete closure of a clinic during normal hours was not observed at any of the other facilities.

Comparison of Admission Systems

Evaluation of the admission systems at each of the facilities was designed to address the ability of each system to accommodate the patient.[7] The mean waiting time required to accomplish pre-admission processing was utilized as an indicator of each system's ability to accommodate patients.

Patient waiting time was measured in two segments: (1) the

waiting time from patient arrival at the admission office until actual admission processing began, and (2) the total wait time from patient arrival until the completion of admission processing. Random sampling of patients reporting to the admitting office for admission was conducted to determine the mean waiting time for both segments. Patients requiring admission for all clinical specialties available at the facility were sampled in order to attain a more representative picture of the systems. Sampling was not conducted at the two hospitals associated with Mayo Clinic, since these facilities are both geographically separated from the Clinic. However, observations regarding the patient flow sequence for these facilities will be discussed.

BMDP Program P7D was once again used to perform one-way analysis of variance on the sample data.[8] Results of the analysis for both segments are presented in Table 19.

Preliminary results of the analysis of variance performed on the sampled data did not provide sufficient evidence to cause rejection of the null hypothesis of no difference between the means for the overall wait time. Pair-wise comparisons of the group means also failed to provide sufficient evidence to cause rejection at the 5 percent level of significance.

Analysis of the tests performed on the sampled data strongly suggested that the overall mean waiting time for pre-admission processing at the three facilities may be equal. Comparison of the patient admission flow sequence, and other descriptive information regarding each facilities admission system, provided

TABLE 19

ANALYSIS OF VARIANCE RESULTS FOR
ADMISSION WAIT TIME

Groups		All Cases	Wilford Hall	Cleveland (A)	Mayo (B)	Ochsner (C)	F Statistic	p-value
Total Wait Time	X	32.1121	31.9214	32.6286	NA	32.3333	0.0214	0.9788
	n	175	99	36	NA	40		
Wait Prior to Processing	X	18.4914	21.6970 **	14.8889	NA	13.8000	4.4981	0.0125
	n	175	99	36	NA	40		

** WHMC was > A and C, ($p < .05$)

additional credence to the similarity of the systems. Each of the systems, including those associated with Mayo Clinic, are automated and very similar with respect to patient flow.

At the risk of appearing too skeptical, the fact that WHMC's admission process does not require the element of financial or third party arrangements must be considered in justifying the low mean waiting time. This consideration is supported by the analysis of variance performed on the sampled data regarding estimates of the mean wait time between patient arrival at the admission office, and the time admission processing actually begins. Results of the one-way analysis of variance and the multiple comparisons of the group means are presented in Table 19.

Preliminary results of the analysis performed on the sample data for this segment of the total wait time indicated significant difference appears to exist between the wait time at WHMC and the other facilities. The null hypothesis of no difference between the means is rejected at the 5 percent level of significance, based on the analysis of the sampled data.

Pair-wise comparisons of the group means indicated that the mean waiting time between arrival in the admission office and the actual start of admission processing, appears to be greater for patients at WHMC, than for patients at both Ochsner Foundation Hospital and Cleveland Clinic Hospital.

The results of this analysis permitted two interesting observations to be made from the sample data. First, although the overall wait time at WHMC appears to be similar to those of the

other facilities, the actual processing time (total admission wait time minus waiting time prior to actual start of processing) appears to be less at WHMC. This appears to support the contention made regarding the absence of financial or third party arrangements for patients being admitted at WHMC. Second, the comparison of the mean waiting times prior to the start of admission processing, indicates that patients at WHMC appear to wait a greater amount of time prior to the start of admission processing. When this observation is compared with the ratio obtained from dividing the staffing levels for the three admission offices by the average number of admissions per day, it appears as though the admission wait time, for patients being admitted to WHMC, may be greater in the near future. The resultant ratios from the above calculation are: (1) WHMC, .329; (2) Ochsner Foundation Hospital, .520; and (3) Cleveland Clinic Hospital, .431. With the opening of the renovated inpatient units at WHMC, bed capacity is once again approaching 1,000 beds. Based on the above observation, it appears as though the corresponding increase in the average number of admissions per day from 60 to appoximately 85, may be expected to increase patient waiting time unless adjustments are made in office staffing.

FOOTNOTES

[1]Roy Penchansky and J. William Thomas, "The Concept of Access," Medical Care 19 (February 1981): p. 127.

[2]W. J. Dixon, ed., BMDP Statistical Software (Los Angeles: University of California Press, 1983).

[3]George W. Snedecor and William G Cochran, Statistical Methods (7th ed. Ames, Iowa: Iowa State University Press, 1980), p. 116.

[4]Roy Penchansky and J. William Thomas, p. 128.

[5]W. J. Dixon, ed., p. 105.

[6]George W. Snedecor and William G Cochran, p. 116.

[7]Roy Penchansky and J. William Thomas, p. 128.

[8]W. J. Dixon, ed., p. 105.

III. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This research effort has compared selected factors of patient access at Wilford Hall USAF Medical Center (WHMC) and three civilian medical centers of comparable size, specialty mix, workload, and mission. Comparisons were made in order to determine whether or not the civilian institutions are providing responsive and efficient patient access modes which could be implemented at WHMC and other military medical treatment facilities to enhance patient access. The factors of patient access considered in the study were classified by the access dimensions of accessibility and accommodation as defined by Penchansky and Thomas.[1] To facilitate uniformity of analysis, the access modes of each facility were addressed in three segments: (1) Appointment Systems, (2) Clinic Operations, and (3) Admission and Disposition Systems.

The results of the study have indicated that the three civilian institutions do provide responsive and efficient patient access modes which can be successfully implemented to enhance patient access at WHMC and other military medical treatment facilities. Specific elements of the observed patient access modes which appear to contribute to, or detract from, responsive patient access have been identified and discussed. A consolidated list of these elements is provided in Table 20.

TABLE 20

ELEMENTS INFLUENCING
PATIENT ACCESS

Appointment Systems	Clinic Operations	Admission Systems
Staffing	Support Staffing	Staffing
Automated Systems	Number of Exam Rooms	Automated Systems
Communication Equipment	Provider Productivity	
Hours of Operation	Hours of Operation	
Log Intervals	Scheduling Process for Test and Consultations	

As stated previously, this research effort has considered selected factors of patient access, and the elements that have been identified as having influence on patient access are by no means exhaustive. However, the results of the comparative analysis have strongly suggested that the responsiveness and efficiency of patient access modes are related to the apportionment of resources, and the application of policy and procedures relevant to the identified access elements.

Based on the results of the comparisons, the enhancements that would make patient access to WHMC more effective are presented as follows: (1) Table 21, Enhancements for Appointment System; (2) Table 22, Enhancements for Clinic Operations; and (3) Table 23, Enhancements for Admissions and Dispositions.

TABLE 21

ENHANCEMENTS FOR APPOINTMENT SYSTEMS

1. Acquisition of an Automated Appointment Scheduling System. (II)
2. Acquisition of an Automated Call Sequencer/Distribution System. (II)
3. Elimination of single station/single line appointment stations. (I)
4. Redistribution of, or increase in Appointment System Staffing. (I) and (II)
5. Extend patient appointment scheduling accessibility for all types of appointments to at least eight hours a day, five days a week. (I)
6. Expand the interval of all Appointment Books/Logs to at least one month, and in most cases at least two months. (I)
7. Development of a reporting mechanism to keep Executive Management informed of appointment availability in all clinical specialties on a recurrent basis. (I)

TABLE 22

ENHANCEMENTS FOR CLINIC OPERATIONS

1. Redistribution of, or increase Clinic Support Staffing. (I) and (II).
2. Optimize the distribution/utilization of Examination Rooms. (I)
3. Optimize provider productivity through improved scheduling/ availability. (I)
4. Expand clinic hours to eight hours a day, five days a week. (I)
5. Development of a synchronous scheduling system for diagnostic testing and consultations. (II)
6. Development of a reliable provider productivity and availability reporting system to keep Executive Management informed of potential accessibility problems. (I)

TABLE 23

ENHANCEMENTS FOR

ADMISSIONS AND DISPOSITIONS

1. Determine potential impact of projected increases in admissions, and adjust staffing accordingly. (I) and (II)
2. Establish a viable Advance Admission Scheduling process. (I)
3. Establish a viable discharge planning and reporting system to assist the A&D Office in optimization of patient bed assignments. (II)
4. Establish and promote compliance with a target discharge time. (I)
5. Develop a method to determine bed status/availability which does not require extensive utilization of medical staff and/or medical resident resources. (I)

At first glance, the list of proposed enhancements may appear quite formidable when considered in entirety. However, further observation reveals that each of the individual enhancements may be classified in two categories. These categories are based on the complexity and time phase requirements associated with the acquisition and distribution of resources, and the coordination of policy and procedure changes. Categories have been identified as follows: (1) Category I, enhancements which require minimum resource acquisition and/or limited policy and procedure coordination; and (2) Category II, enhancements which require extensive resource acquisition and/or significant policy and procedure coordination. Category I enhancements should generally require less than sixty days for development and implementation. Development of Category II enhancements may require development and implementation periods in excess of one year due to the extent of resource and coordination involved. The category of each enhancement identified in the preceding tables has been designated by the placement of the Roman numerals I, and II, at the end of the enhancements.

Several enhancements have been identified with both categories since portions of these enhancements may fit either category. For example, consider the possible redistribution or increasing of clinic support staffing identified under Enhancements for Clinical Operations. Redistribution of staffing may be feasible through adjustments to the current level of in-house staffing, and thus require a a short lead time. However, if a redistribution of

in-house staffing is not feasible, a change request for increased staffing would require coordination and approval from higher headquarters and thus a significantly longer lead time.

Only three of the identified enhancements include preliminary requirements for extensive acquisition of resources. The three included are: (1) Acquisition of an Automated Appointment Scheduling System, (2) Acquisition of an Automated Call Sequencer, and (3) Development of a synchronous scheduling system for diagnostic testing and consultations. Each of these enhancements will require major capital investments and significant coordination and approval from higher headquarters. Possible sources for Automated Appointment Scheduling Systems include: (1) commercial vendors, (2) the Department of Defense, Tri-Service Medical Information System Program Office, and (3) in-house development by the Medical Systems Division, WHMC. Several types of Automate Call Sequencers are available through commercial sources.

If adopted, the acquisition and coordination associated the development of a synchronous scheduling system for diagnostic testing and consultations will involve the most extensive undertaking of all proposed enhancements. Implementation will require significant planning, programming and budgeting input to obtain necessary resources because the concept would be entirely new for WHMC.

The process of selecting and implementing enhancements to patient access at WHMC and other health care facilities is a

sizable endeavor to say the least. Efforts to incorporate any or all of the proposed enhancements must receive continued support from Executive Management during the planning , implementation, and assessment phases of the endeavor.

A proposed list of major actions which must be accomplished when considering each of the possible enhancements to patient access are presented in Table 24.

Recommendations

Modern health care facilities are highly dynamic organizations which require constant integration of functions if patients are to receive responsive and efficient accessibility. Efforts to enhance patient access within these facilities must also be highly integrated to insure that improvements in one segment are not compromised by deficiencies in another. The following recommendations are made regarding the enhancement of patient access at WHMC.

Recommendations:

1. Executive Management implement the enhancements to patient access identified by this study at WHMC.

2. Enhancements selected for implementation should be developed and implemented as soon as possible.

3. The Patient Access Enhancement Plan be followed in development and implementation of selected enhancements.

TABLE 24

PATIENT ACCESS ENHANCEMENT PLAN

1. Executive Management select patient access enhancements to be implemented at WHMC.
2. Prioritize implementation of selections.
3. Designation of ad hoc committees to address feasibility of selected enhancements.
    A. Appointment System Committee
    B. Clinic Operations Committee
    C. Admissions and Dispositions Committee
4. Assign suspense dates for recommendations based on enhancement categories.
5. Receive committee recommendations.
6. Direct development of selected recommendations.
7. Determine resource availability and acquisition requirements.
8. Determine and initiate coordination requirements.
    A. Patients
    B. Staff
    C. Other Agencies
9. Complete coordination/approval actions.
10. Requisition resources.
11. Implement Enhancements.
12. Assess and evaluate results.
13. Make adjustments as needed.

FOOTNOTES

[1]Roy Penchansky and J. William Thomas, "The Concept of Access," Medical Care 19 (February 1981): p. 127.

APPENDIX A

PROCEDURAL DOCUMENTS

APPOINTMENT SYSTEM INFORMATION

OPERATIONS

- Describe appointment system for each clinic of concern.

    - Manual vs. Automated?

    - Centralized vs. decentralized?

    - Type of forms or documents.

    - Forms/Documents distribution to clinics, records department.

    - Access control to appointments area?

    -----Providers
    -----Nurses
    -----Others

    - Design layout of Appointments Area.

    - Vicinity relationship to clinic areas.

    - Hours of operation.

    - Next Available Appointment Date.

    - Appointment intervals for each clinic / provider type.

    - How far in advance are books/schedules kept?

    - Problem with "No Shows" / Broken Appts?

    -----Percentage?

    - Information exchange with requesting party.

    -----Date of Appt.
    -----Time of Appt.
    -----Clinic location.
    -----Provider name.
    -----Other.

    - Registration required prior to scheduling Appt.?

    - Published policy for Appointments Desk?

    -----For Staff?
    -----For Patients?

- Patient / Staff complaints regarding access to appointment system?

- Are books/schedules kept for all providers in clinics?

- Estimated patient population.

- Number of unfilled / unused appointments per day.

- Are providers available in clinics during routine time frames, or do their schedules fluctuate significantly?

- Do clinics provide projected provider availability schedules or calendars?

- Are any appointments blocked for acute problems on a day to day basis.

- Number of appointments available in each clinic per day.

- Data available on: avg. length of calls, peak periods.

- Different/Unique books/schedules kept for individual providers?

- Management Reports submitted on appointment system operations?

- Coordination with clinics.

- Other problems?

COMMUNICATIONS

- Communications Equipment
  --Phone equipment
  --Call Sequencers
  --Recording devices (Messages)
  --Background music.
  --Number of incoming lines.
  --Special lines for in-house communications.
  --Special lines for cancellations.

- Special lines for long distance calls?

- Publishing of phone numbers.

- Number of calls per day
----Total.
----Per clinic.

PERSONNEL

- Staffing of appointments system.

---Organization

---Number of persons.

---Experience.

---Turnover.

---Training and orientation.

-----Functional Training.

-----Triage of patient symptoms?

- Female / Male staffing mix for responding to sensitive patient problems?

OTHER OBSERVATIONS

CLINIC INFORMATION

DESIGN

- Clinic Area Design(s)
  - --Number of Exam Rooms per provider
  - --Waiting and Reception area
  - --Directional and Information signs

OPERATIONS

- Clinic Management Structure
- Work load trends
- Provider productivity
- Provider availability schedules
- Patient Flow process
- Any appointments made in clinic?
- How are referrals and consults tracked?
- Ratio of Lay referrals to Provider referrals?
- Treatment Records
  - --Maintenance
  - --Storage
  - --Entries
- Are Patient surveys ever conducted?
  - --Comments regarding waiting time?
- Patient Representative program

--Emphasis on courtesy

- Walk-in Policy
- Hours of clinic operation
- Provider of choice available?
- Coordination process with:

  --Admissions

  --Appointments system
- Patient Information brochures
- Acute Care Clinic (Same day)
- Recent studies regarding access, patient flow, productivity.
- Definition of Patient Visit / Encounter.
- Provider entries in treatment records
- Standard ancillary work request?
- Routine Physicals conducted during regular clinics
- Management reports
- List of Specialties / Sub-specialties in each clinic

PERSONNEL

- Clinic Staffing (Number and Type)

  --Providers (Mix, ratio of Staff to Residents/Fellows)

  --Support (RN's, LVN's, Tech's, Receptionist, Volunteers)

  --Training and Orientation of Support Staff

COMMUNICATIONS

- Patient telephone access to clinic
- Patient access to Providers

- Communication Links with:
  - --Appointment System
  - --Other clinics
  - --Admissions
  - --Other
- Follow-up patient contact for test result (Who)

OTHER OBSERVATIONS

ADMISSIONS OFFICE INFORMATION

OPERATIONS

- Design of Admissions area
  - --Waiting area
  - --Office area
- Admissions Process Flow
- Automated
- Bed control and assignment
- Policy
- Priority for admissions
- Coordination with:
  - --Clinics
  - --Units
  - --Surgery
  - --Other
- Admissions centralized for all services?
- How are projected admissions tracked?
- Discharge Policy
  - --Time
  - --Coordination
  - --After hours
- Admissions document package prepared in advance?
- Census taking process
- Admissions per day
- Length of stay

- Occupancy rate
- Demographic data
- Hours of operation
- Management Reports
- Admission Trends
- Operating beds

PERSONNEL

- Staffing
  - --Management
  - --Training and orientation
  - --Turnover

COMMUNICATIONS

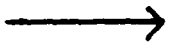
- Communications with:
  - --Clinics
  - --Providers
  - --Surgery
- Referrals

APPENDIX B

FLOW CHART SYMBOLS

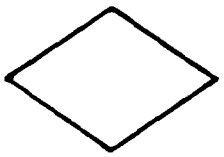
KEY TO FLOW CHART SYMBOLS

Terminal (start, stop, interrupt)



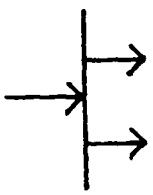
Direction of flow

Operation or process being accomplished

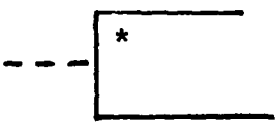


Decision or switching process

On page connector



Parallel Modes



Comment/Annotation of additional information

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